Siboga-Expeditie
III

HYDROGRAPHIC RESULTS OF THE SIBOGA-EXPEDITION

BY

G. F. TYDEMAN

With 24 charts and plans
and 3 charts of depths

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I.

GENERAL OBSERVATIONS AND RESULTS OF SURVEYING

REMARKS ON THE OBSERVATIONS MADE.

The results of the expedition from a hydrographical point of view are various and do not confine themselves only to those which accidentally emanate from the soundings made with a scientific object.

A great many data were obtained also in a more narrow sense, that is to say to the direct advantage of navigation and cartography. That there would be a strong inducement to gather such data could be told beforehand, the seacharts of the eastern part of the East Indian Archipelago being for the greater part a compilation of superficial surveys, amongst which are a great many of very old date.

As a consequence the Government was only disposed to assist the expedition upon condition that the commander of the expedition-vessel should have practical experience of hydrographical surveying.

It was very difficult however to know beforehand, in how far and where the circumstances of the voyages and the limited staff would permit the obtaining of a substantial result in this direction without detriment to the main object of the expedition. It soon appeared that

the number of the officers was too small to set about working both hydrographically and meteorologically on a rather extensive scale.

As the value of meteorological observations in those regions could only be of small importance, on account of the continual shifting of the ship, it was preferred that those available should coöperate in obtaining as many as possible hydrographic data only.

As the number of points which are correctly determined, is rather large even in the Eastern part of the Archipelago, and the voyage could so be arranged, that as a rule there would be an occasion to control the chronometers every two or three weeks, it was deemed sufficient to supply 2 chronometers and one observation watch. There were no special instruments on board; some spare sextants were only taken along and the drawing-material was somewhat completed.

A steamlaunch being available we were able to make more or less complete plans of nearly all anchorages, visited by the "Siboga", of which no good detailcharts existed as yet. Sometimes we could spare only a couple of hours for this work.

For these observations the height of the rigging was generally taken as a base, the azimuthal direction was determined by astronomical bearings in many instances, and the longitude and latitude of some point on shore were fixed as minutely as possible with the aid of the artificial horizon, or those of the anchorage through altitudes of sun and stars on board. A statement of the points determined in this way will be found in appendix I.

Good results were obtained by making use of altitudes of stars during twilight. It is well known that in the vicinity of the equator these are the best, in many instances even the only means, to obtain a set of correct observations with a proper azimuth-difference.

A common celestial globe, such a one as we had on board, appeared to be a welcome means to identify the stars observed.

Though of course, on taking sights on board, possible deviations of the dip of the horizon will not always be eliminated from the result of the observations, it has never occurred that the final influence of these deviations need be supposed to be upwards of 2′. The results of the observations in the artificial horizon — thanks to the frequent chronometer-verifications — are most probably all correct within 1′, also as to the longitudes.

For the calculation of the observations we always made use of the method of the altitude-lines; for the sake of accuracy we always used the logarithmic calculation and the result of several altitude-lines was found through construction on a large scale. The detail-charts of the anchorages etc., compiled in the above way, are for the greater part reproduced in this work; many of them have already been published by the Marine Department at the Hague.

Apart from these isolated smaller surveys, which were carried out by means of a rudder-boat or steamlaunch, we obtained several more extensive corrections of the chart of the Moluccas with the ship itself, by means of bearings during the run, in connection with astronomical bearings and points and dead reckoning. As the route to be followed by the "Siboga" was determined on the one side by the scientific object of the expedition and on the other by the exigencies of a safe navigation, we had only now and then an occasion to go along the shore so closely that we could also determinate with some correctness the outlines

of the islands and of the dangers in the vicinity of the coast. As a consequence the main object of the observations meant here was to verify as exactly as possible the position of the islands, of their main prominent points and mountain tops. The position of a number of mountain tops is given here after in Chapter II.

In this way we succeeded in collecting a great many data about the greater part of the groups of islands visited or passed. From many of them corrections of the charts emanated directly, whilst others formed a welcome amplification of the hydrographical archives of the Marine Department.

The parts, the charts of which have undergone more or less important modifications by our work are the following:

Sambaki Straits and Herberg Straits, the Northern fairway to Batjan;
the Northwestern part of Obi Major with Obi Latu, Bisa and Tapat;
the islands South of Halmaheira (Doworra, Five islands and Damar-group);
the Widi (Weda) islands;
the islands of Gebé, Ju and Gagi;
Bougainville Straits and vicinity (Ien-islands, Ruieb, northwest coast Waigeu, Batang Pali and Dju);
the Jef-Fam-group, Jef-Doif-group and Kofiau;
the islands west of Salawatti and those North and East of Misool (Vettor Pisani, Seven-islands, False Pisangs);
Sabuda with the Pisangs;
Batu Putih and the landpoint South of the entrance of the Mac-Cluer gulf;
East coast of Ceram from Gisser till Waru;
Sula Besi and Lisa Matula;
the Watubela-islands and the group of Kur;
Dammer and vicinity;
Roma with the group East of Roma;
Letti, Moa and Lakor;
the South coast of Timor from the North-East point of this island till Batu Putih, the South corner of the Noimini-bay;
the East coast of Rotti;
the South coast of Lomblen;
the South coast of Flores;
the island of Binongka.

Charts of some of these surveys will be found in this work; these charts, as well as the other data, were used by the Dutch Hydrographic Department for the correction of the Dutch East Indian sea-charts.

On elaborating some of these surveys the data in possession of the Department above referred to, were made use of.

REMARKS ON THE NAVIGATION IN THE EASTERN PART OF THE EAST INDIAN ARCHIPELAGO.

Although the chart of the East Indian Archipelago East of Celebes consists almost entirely and West of Celebes for a large part still of a compilation of superficial observations

and isolated data, we may take it that the navigation of the principal fairways and of the most used passages, when using proper seamanship, is not so dangerous for steamers, as is still believed perhaps now and then.

Apart from the more immediate vicinity of the many islands and the interior of many groups of islands, it is not probable that in those waters, the depth of which is considerable according to the soundings made so far, and which have already seen a good deal of navigation in the course of time, there should still exist many unknown dangers. On the other hand it is however probable that the places, given on the charts for some of the more isolated dangers, are still more or less incorrect. As a rule however these dangers may be passed without inconvenience at a considerable distance.

A circumstance, by which the safety of navigation in this part of the Archipelago benefits nearly everywhere, is the great clearness of the water, in consequence of which, by day-time and when keeping a proper look-out, shallow places can as a rule be seen in time. We could often distinctly see the bottom at 10 to 12 fathoms, sometimes even by moonlight. The dark spots on the bottom were even not seldom still visible at a depth of 15 fathoms (27 M). Those regions, where relatively small depths and a muddy bottom are found over a large area, such as in the vicinity of the West-Coast of New Guinea, form an exception in this respect.

The clearness of the atmosphere during the greater part of the year, in connection with the height and steepness of many islands, is likewise a compensation for the lack of large coast-lights when navigating during the night. It is therefore often possible to take reliable bearings and to navigate on sight also during the night, indifferently whether the moon shines or not. In this respect we made an observation of a particular nature, the knowledge of which may be to the advantage of the navigator eventually, and which reminds of the iceblink of the polar regions.

In the night of 24th—25th September, at about 9 to 10 o'clock with a clear starry sky without moon and with good sight, when coursing W. S. W., according to the dead reckoning straight on the light of Saleyer Straits, the distance from these straits being 20 to 25 nautical miles, we distinctly observed the following phenomenon:

From about right ahead till at some distance on the port side the atmosphere close to the horizon was somewhat dark; North and South of this dark streak the atmosphere was lighter. In spite of the diffusedness of the phenomenon the difference in shade was very distinctly to be observed, even definitely obvious. Supposing that the dark streak extended itself above the Straits and the lighter tints were occasioned by the diffuse light from the stars, reverberated by the atmosphere above the shore of Celebes and Saleyer, containing more condensed water-damp, we concluded from the bearing of the dark streak that the ship was more North than according to the dead reckoning.

When at 10$^{3}/_{4}{}^{h}$ we sighted the light of Saleyer (Pamatati) this conclusion proved to have been quite correct, as according to the bearings the ship was about 5 nautical miles more North than was reckoned, and was in fact steering about towards the North side of the Straits.

A frequent characteristic of these waters is the steepness of the coasts and coastreefs and as a consequence the great depth, in which must be anchored eventually.

Several anchorages can only be of use with the aid of a shorefast, and should be considered as quite impracticable in a more unsteady and rougher climate. Meantime it may be expected that on a further detailed survey still many proper anchorages, which are unknown as yet, will be discovered.

We often used the submarine sentry with great success. It is true that this instrument best answers its purpose in waters with moderate and gradually varying depths, sothat there is not much reason to use it for the common navigation in the East Indian Archipelago, but for a ship which has set herself the task to find out the existence and the place of shallow spots this instrument is of great value. Above the THOMSON lead it has the advantage to give almost without any labour absolute certainty about the fact whether there are any or no depths of less than 30 or 40 fathoms on the course-line of the ship. Exactly in seas such as those of the East Indian Archipelago, where shallow places are sometimes of so small dimensions and surrounded by great depths, the THOMSON lead does not afford this certainty, as it is very possible that a much smaller depth than the one sounded is passed between two soundings. And exactly in the Archipelago the knowledge of the depths of 30 fathoms and less is specially required, as these afford the opportunity eventually of anchoring, whereas otherwise the ship would perhaps have to stand to the offing during the night failing an anchorage.

Depths of about 30 fathoms and less have often been discovered with the submarine sentry, depths which would have been passed undetected without this instrument.

REMARKS ON CURRENTS.

The knowledge of the sea-currents in this part of the Archipelago is still very incomplete. The few observations which the "Siboga" could make in this direction corroborate the rule that the water at the surface follows the general direction of the prevailing monsoon-wind; further that the tide-currents have a moderate velocity in the main, but can be very strong in the straits, as is well-known.

Although we have made no formal trials for measuring the velocity of currents at different depths, the frequent working with the nets and the occasions on which we had the ship drifting with the lead veered out, have afforded the opportunity to obtain some idea about the movement of the water at different depths.

From the observations thus made it may be derived that generally speaking the water in the offing is nearly in rest at a depth of more than 100 to 150 Metres, but that the water from the surface till this depth is as a rule in a perceptible movement. Probably it is in the first place the effect of the tide-currents that makes itself felt untill this depth.

This result agrees in a remarkable manner with the characteristic features of the temperatures at the surface and at various depths in the Archipelago and in general in the tropical regions.

In the East Indian Archipelago the temperature of the seawater often decreases slowly

until at a depth of about 100 Metres, and at a rather fast rate beneath this depth, a fact which in itself gives already rise to the supposition that till this depth the water is subject to a continual mixing, which must be principally a consequence of currents.

In one case however a streaming layer of water of a rather large depth was distinctly found. On 12th September 1899 a. m. with a rather strong S. E. monsoon (direction of the wind S. S. E.) in Manipa Strait, at 3° 20′ S. lat. and 122° 23′ E. Long. (Stat. 185), fishing with the vertical net at a depth of 1536 Metres, the following was observed:

With the engines stopped, laying E. N. E., the ship drifted with a moderate speed in a Northerly direction, according to the bearings 0.5 nautical mile per hour.

The net being out on S. B., the cable pointed in a Southerly direction, after 1536 M. being veered out, the cable making an angle of 10° with the vertical. When the net was drawn up the cable remained in about this position until there were still 800 Metres out. From this moment the cable approached more and more the vertical position and then passed same, sothat it pointed under the ship in a Northerly direction. When there were still 100 Metres out the position rapidly changed, and the cable went strongly to starboard again, i. e. pointing to the South, now making an angle of 25° to 30° with the vertical, until the net arrived at the surface. According to the bearings the movement of the ship had been during all that time continually and regularly in a Northerly direction.

It follows from this observation that the water was in rest or almost in rest at a depth of more than 800 Metres; that the layer of water from 800 till 100 Metres of depth streamed decidedly and with a rather great velocity in a Northerly direction, whereas finally the water at the surface (or somewhat below same) until a depth of 100 Metres was again almost in rest, consequently streamed in a Southerly direction with respect to the layer of water just mentioned.

The obvious explanation of this complicated movement of the waterlayers is that the water of the Banda-sea was pushed into the Ceram-sea through the gorge of Manipa Strait (which gets narrower to the North) until a depth of 800 Metres in consequence of the monsoon-drift current, but that at the time of the observation a superficial layer of a thickness of 100 Metres was in a relatively opposite movement, owing to tide-current. This depth of 800 Metres was somewhat striking, as it materially strengthened our supposition, that the great depths of Manipa Strait would appear to be interrupted on the North side by a ridge of much smaller depth. The "Siboga" was exactly going to try to get certainty as to this. The very same day we made three soundings between Buru and Manipa, (Stat. 186, 187 and 188), which proved that this ridge exists. Though the smallest of these soundings was 940 Metres the observation of the current as explained above gives rise to the supposition that a further exploration would show that there is a ridge of some 800 Metres depth, though it may also be possible that when hauling in the net, the effect of the influence of the current, could only be observed after the net had been exposed to same for some time. That the bottom on the spots where we made the soundings is subject to strong scouring by the current, is more than probable, seeing that on two soundings the lead struck hard and gave no bottomproof, on the third only some gravel and coarse sand.

REMARKS ON CORAL-REEFS.

Here and there we observed a peculiarity in the formation of the coast-reefs, which must probably be attributed to the influence of the current and which is of some importance to the navigation. For the zoölogist, too, it was an interesting fact; it has already been referred to by Prof. WEBER in Part. I of this work.

It occurs that the coast-reef bends inward in some places, where apparently the conditions for thriving of the coral-reefs are unfavorable over a certain extent. Whereas a strong coral-reef develops itself on both sides, growing in thickness towards the sea, the bottom on these spots is covered with coral-sand, sometimes mixed with mud. As a consequence a deep spot is found between the shallow reefs on both sides, which is often sufficiently capacious to afford a proper anchorage to the ships.

In some cases the reason of the formation of such like spots is possibly the freshwater and the alluvion from little rivers, but this is not always the case. Typical cases of the formation, meant here, were found at Sanana (Dutch chart 149), Seba on the island of Savu, at Kilsoein on the Westcoast of Kur (Dutch chart 150), near Kampong Palahidu (see Pl. XI and Dutch chart 42) on the Northcoast of the island of Binongka and North of Tandjong Manuoi (see Pl. XX) on the Eastcoast of Rotti, whilst the charts of the anchorages in the East Indian Archipelago give still more examples.

The most acceptable explanation of the formation and the permanent existence, — at least for a considerable time — of these spots is in my opinion the following:

Dependent on the configuration of the coastline and the vertical shape of the seabottom, and in connection with prevailing currents and the regular alternation of the tide currents, there must necessarily be points here and there, where the water is only unmaterially subject to streaming, same consisting principally in a slowly circulating movement, about in the same way as is the case in rivers, down of corners. Just the same as there, a continuous settling down of the stuffs in suspension in the water takes place in such spots, stuffs which consist here principally of the fine coralsand, which is formed by the reef in the vicinity through the surf and current, and which remains temporarily in suspension in the water. As well the loose coralsand bottom formed in this way as the rain of sand itself and the scanty refreshment of the water, must be noxious conditions for the life of reef-forming corals, and also for many other species of animals. Now whereas the reef grows on both sides towards the surface and to seaward, the spots in question retain their sand bottom and at the same time a certain depth, which depends on the current which may still be found along that bottom, on the slope of the latter and possibly on other circumstances still.

The presence of the deep basins and cavities, that are frequently to be found in reefs, which are for the rest strongly developed (see a. o. Baars-island, Dutch chart 118), must likewise most probably be attributed to dead currents, during a sufficiently long duration, and as a consequence to locally bad conditions for the life of corals.

REMARKS ON THE SLOPE OF THE SEA-BOTTOM NEAR THE COASTS AND COAST-REEFS.

As has already been observed, the great depths, which are found until quite near the coasts and coast-reefs, form a characteristic of the sea-bottom in the greater part of the seas visited by the "Siboga". Though the time and the staff available did not permit to make systematic observations to determine the slope of the bottom near the coasts, we obtained some data on this point here and there from the soundings made, data some of which are sufficiently correct to be mentioned here.

Kabia (Baars-island) in the Western part of the Banda-sea. In the vicinity of this island four soundings were made, each time the distance to the coast-reef being exactly determined, viz:

Distance to the outer border of the reef.	Depth.
1300 M.	701 M.
875 „	500 „
315 „	209 „
300 „	184 „

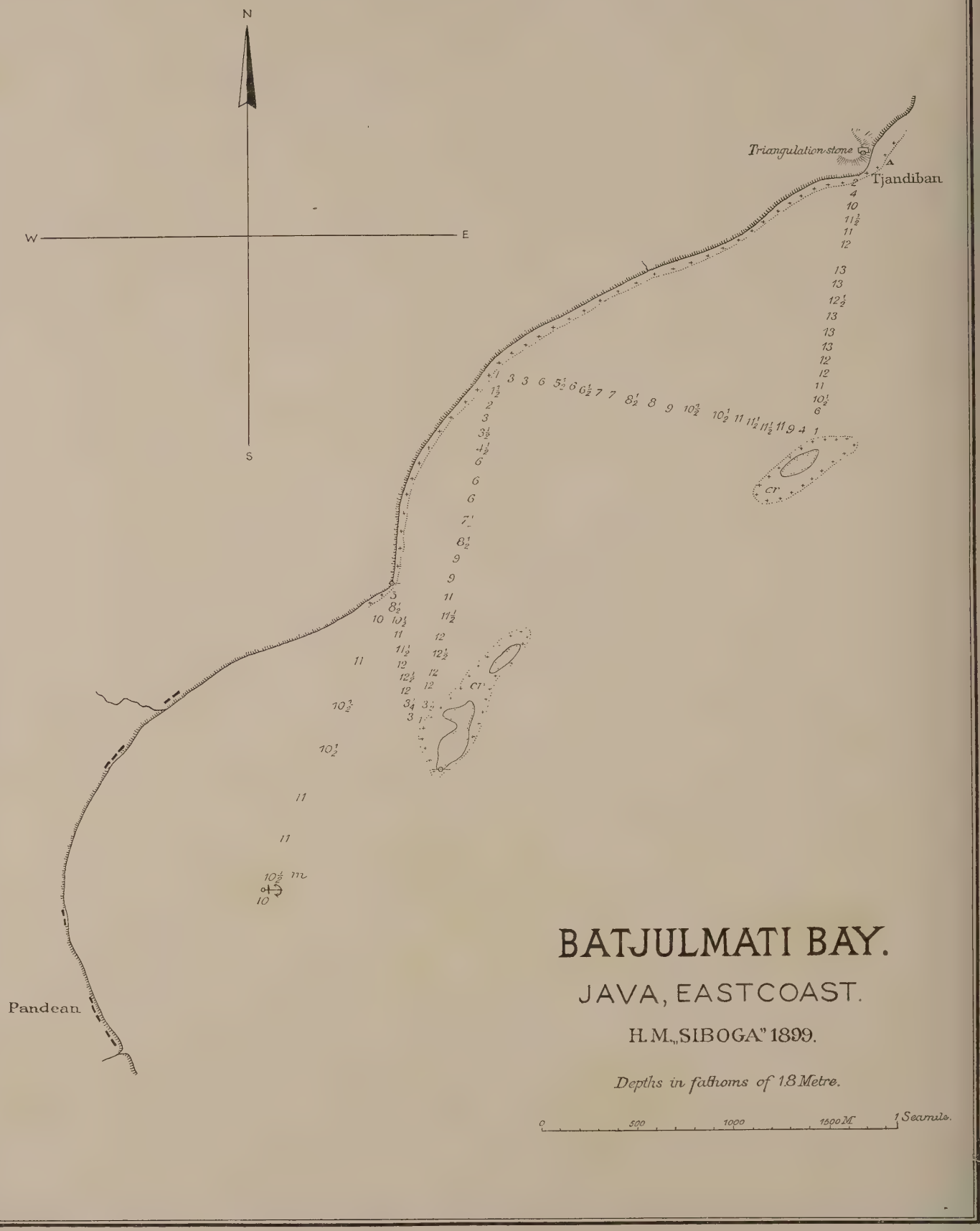
In the more immediate vicinity of the reef we sounded depths of 50 and 80 fathoms, so that we could not think of anchoring, and it may be taken as most probable, that the outer border of the reef descends next to perpendicularly until a depth of 45 Metres or more.

The average slope of the bottom, which would follow in this case from each of the above soundings, is, reckoning from the foot of the reef, respectively: 27°, 27°5, 27°5 and 25°, which values concord conspicuously. About these four soundings we must, namely, observe, that they are not all in one line; the former two were taken about West of the N. W. point of the reef; the latter two South of the reef, the distance between these two being 600 Metres in an E.-W. direction.

Lucipara-islands. In the vicinity of this group of islands the following soundings were obtained, a. o. (see Pl. XII):

		Distance to the outer border of the reef.	Depth.
(1)	On the Southwest and Southside.	2000 M.	894 M.
(2)		1600 „	646 „
(3)		1150 „	510 „
(4)		700 „	421 „
(5)	On the Eastside.	150 „	254 „
(6)	On the Southside.	90 „	173 „

The reef, surrounding these islands, is particularly steep; immediately outside the border, which uncovers at low water, the wall descends so steeply that it gives the impression of being vertical or even of drooping over. At a distance of a few boats lengths we could not sound the bottom with 30 and 40 fathoms.



BATJULMATI BAY.

JAVA, EASTCOAST.

H.M. „SIBOGA" 1899.

Depths in fathoms of 1.8 Metre.

0 500 1000 1500 M. 1 Seamile.

If we take a depth of 40 fathoms, i. e. 72 Meters, for the perpendicular outer border of this reef, the latter two depths (5) and (6), reckoned from the foot of the reef, indicate bottom slopes of respectively 50°5 and 48° with the horizontal plane, which probably is the natural slope of dead coral detritus.

If on the sides of the other soundings mentioned, at a distance of 150 Meters from the reef, a depth of 254 Meters were found everywhere and this formed the foot of the talud, the average bottomslopes until the other soundings would be:

(1) 19°
(2) 15°
(3) 14°3
(4) 16°9.

The soundings (2) and (4) are in a line, about perpendicular on the direction of the reefborder.

II.

HYDROGRAPHIC NOTICES.

In these notices all courses and bearings are true.
Depths are given in fathoms of 1,80 Metres.
All heights are those of the highest visible points, trees included in case of vegetation. In the plans and charts belonging to this chapter heights are written in erect cyphers; they are given in Metres.
The sea-charts referred to in these notices, unless otherwise mentioned, are those, published by the Hydrographic Office at the Hague up to the year 1899, some of which have been corrected since.
The stations, indicated as (Stat.) in these notices, are to be found in the first monograph of this publication; they mention the places, where scientific work was executed.
Some of these notices have already appeared in the "Mededeelingen op Zeevaartkundig gebied", published by the same Hydrographic Office in the year 1900.

1. **Badjulmati (Pandean),** Java East Coast. 10. III. 1899. Plate I. (Stat. 7). A good anchorage, especially in the West monsoon, was found in 10 to 11 fathoms, mud, Pandean village bearing 232°, and Tjandiban Point 46°.

The direct current running through Bali Strait is not felt here.

Between the reefs and the shore there is a good space with sufficient depth.

2. **Kankamaraän Bay,** Kangeang Island. 15. III. 1899. (Stat. 16). The bay between Kangeang and Saubi Island is called Kankamaraän by the natives. There is a very good anchorage in each monsoon West of Saubi in 9 to 11 fathoms, muddy bottom. The plan (14) on chart 117 is sufficiently correct. The entrance between Saubi and Sepapang is spacious and in midchannel without any danger. According to the natives navigation in the

inner part of the bay is easy, the reefs being clearly visible everywhere. In Saubi village fish, fowl and fruit are obtainable. Good hunting grounds; deer, wild duck and pigeons. Half an hour distant from this village there are two small lakes of fresh water.

3. **Ketapang Bay,** Kangeang Island. 19. II. 1900. (Stat. 317). A very good survey of this bay has recently been made by the N. I. Government steamer "Reiger". A thickly grown hill in line with the white pyramid, bearing 56°, is a good mark for entering. It may be kept until the $2^1/_2$-fathoms-reef with beacon is about 500 M. distant, when the course is gradually altered for the flagstaff of Kalisangka village, where there is a landing pier.

A good anchorage was found in $5^1/_2$ fathoms, mud and sand, Batu Gula Point bearing 327°, White Pyramid 5°, Kalisangka Flagstaff (pier) 71°, and the Beacon with ball 174°.

Small vessels may anchor nearer to the shore in 4 fathoms, sand, abreast Ketapang village. In the West monsoon however both these anchorages are much exposed; a safe anchorage may then be found Southeast of Manrupit islet.

When leaving the bay in the above leading mark the ship is clear from the bank, which extends Southwest of Manrupit, when Urk Island is wholly visible.

The chart of Kangeang and surroundings is not correct, the position of the island being about 3 miles more to the South and somewhat more to the West.

Near Ardjassa, the residence of the „Controleur", about ten miles from the coast, is a fine dropstone grotto. Good provisions may be procured from this village.

Urk Island is a wooded coral islet, extending about one seamile in an Eastsoutheast direction, surrounded by a steep coralreef. 300 M. distant from the East side of this reef a depth of 44 fathoms, coral bottom, was found. The top of the highest tree is 47 M. above the sea level.

4. **Sangkapura,** Bawean Island. 24. II. 1900. (Stat. 323). The leading mark "Tunkil Hill in line with an other higher hill further inland", bearing almost North, is good, but Tunkil Hill is rather low, and can only be seen when in the line or West of it.

5. **Labuan Tring Bay,** Lombok, West coast. 19. III. 1899. (Stat. 19). This bay offers very good anchorage in each monsoon. The plan (4) on chart 117 is rather correct; South of Kaju Puti village however a rocky point extends more to the East than indicated on this chart. It neither shows a river with very good fresh water, existing in the Southern part of the bay. The bar of this river being shallow, boats have to wait for high water for entering. Eight tons of fresh water were loaded in two boats in the first branch of this river on the Western side, where villages are situated.

6. **Penida Island,** Lombok Strait. 22. III. 1899. This island is populated and cultivated throughout. It is rocky and hilly, and highest, about 600 M., in the Western part. Part of the East coast consists of vertical walls of tuff in horizontal layers; on the North and Northwest coasts many sandy shores were seen. The South coast consists nearly entirely of

steep and broken bluffs of tuff with some rocks not far from the coast. The Southernmost of these rocks, when seen from the Northwest, has quite the shape of a shoe; Northwest of this rock is another one, pierced by a large hole. A small, flat rock, not far South from the Westpoint of the island, is not shown on the chart.

When navigating along this coast at a distance of 1 to $1^1/_2$ seamile, Shoe Rock being passed at about half a mile, no other dangers were seen, than those mentioned above.

The islands of Lembongan and Tjeningan Northwest of Penida, both well populated and cultivated, are connected by a fordable reef. As far as could be seen the passage between Penida and Tjeningan, in the Southern entrance of which a depth of 106 fathoms was found, seemed to be free from dangers. In this entrance and South of it a strong current was experienced.

7. **Labuan Amok,** Bali, Southeast Coast. 22. III. 1899. This bay affords a very good anchorage in the West monsoon, in 13 fathoms, mud, Tepèkong Island bearing 109° and Tèh (Castor) Point 193°, which position does not differ much from that given in the "Indian Archipelago, Western Part". A good leading mark for approaching this anchorage is "Gunong Api" (Bali Peak), bearing 355°, nearly between Gunong Mutjong and Bukit Pateh, somewhat nearer to the latter. Gunong Mutjong is a conspicuous hill, with a sharp conical top, not far from the coast; it is wooded, the left side however being grown with grass only. Bukit Pateh, West of which is a creek, is a broad and round hill with little vegetation near the coast. Pigs and fruit may be procured from the village.

8. **Pidjot Bay,** Lombok, East Coast. 24. III. 1899. (Stat. 33). The name is Pidjot instead of Pidju, as is indicated on the chart. Some provisions may be obtained here.

9. **Labuan Pandan,** Lombok, East Coast. 27. III. 1899. (Stat. 34). Affords a good anchorage in the West monsoon, at a distance of some cables from the shore, off the Southern part of the village, where, nearer to the shore, the coasting vessels have their anchorage. The best landing place is abreast the middle of the village; here too, however, some lumps of coral are lying near the shore. At low water landing is difficult. The flood-stream running to the Northward, the ebb-stream to the Southward, were observed to have both a velocity of $1^1/_2$ knots per hour.

Paternoster Islands. 29. III. — 3. IV. 1899.

10. **Sakuntji Reef (Maria Reigersbergen).** At a distance of nearly one seamile South of the Easternmost dry patch of this reef a depth of 62 fathoms was found; Southeast of it at the same distance 102 fathoms.

On **Huzaar Reef** a large wreck was seen.

11. **Sailus Ketjil.** 29. III. 1899. (Stat. 37). On the Northeast side of this island a good anchorage was found in $8^1/_2$ fathoms, coralsand and coral, the East point of the wooded

ledge Southeast of the island bearing 162°, the North point of Sailus Ketjil 269°, the West point of Perbatuan 11°, and the East point of Perbatuan 20°, the distance from the reef being 400 M.

The depths are irregular; East of this anchorage a sounding of $6^1/_2$ fathoms was obtained.

On approaching from the Southward, Sailus Besar being ahead, bearing N. W. by N., no shoal water or dangers were seen. On reaching the depths of 12 fathoms the bottom became clearly visible, the depth then gradually decreasing.

The wooded ledge, mentioned above, stretching in an Eastnortheast direction, forms a separate islet, connected with Sailus Ketjil by a shallow reef. On the South side of this islet there is no reef but there are great depths quite near to the shore. The reef on the Northeast side of Sailus Ketjil has a breadth of about 150 M.

12. **Sailus Besar.** 17. II. 1900. (Stat. 315). The "Siboga" anchored between this island and Perbatuan in 15 fathoms, coral and sand, the extremities of Sailus Ketjil bearing 175° and 191° and those of Sailus Besar 221° and 275°.

The channel between Sailus Besar and Perbatuan is free from dangers; the islands however are bordered by reefs.

13. **Pulu Kawassang.** 2. IV. 1899. (Stat. 40). From the West point of this island a reef extends, the South side of which is steep to. On the West side of this reef good anchorage was found in depths varying from 5 to 9 fathoms, the North point of Sapiengan being in line with the South point of Kawassang, bearing 90°, the Southeast point of Aloan 51°, and the East point of Tampahan Besar 341°.

A small number of fishermen were staying on Kawassang island. The island, indicated on the chart as Tampahan Ketjil, was called by them Bòkòh.

Coursing from Sailus Ketjil to Kawassang and from there, between Sapiengan and Aloan, to Sarassa, one of the Postillon Islands, no indication of danger was seen. Midchannel between Aloan and Sapiengan a sounding was obtained of 53 fathoms; in the midst of the passage between the Paternoster and the Postillon groups the lead showed a depth of 317 fathoms.

14. **Pulu Sarassa,** Postillon Islands. 4. IV. 1899. (Stat. 43). The West point of Sapuka Ketjil bearing 348°, the Northwest point of Sarassa Ketjil 48°, and the South point of Sarassa Besar 74°, Saringitan being in line with the centre of Sarassa Besar, anchorage was found in 10 fathoms, coral bottom, the surrounding depths being variable, although within a distance of some cables all round not less than 7 fathoms was found.

Sarassa island consists of two islets, the water between them being very shallow.

Within a distance of about 6 seamiles South of Sarassa the depths vary from 18 to 36 fathoms, with one coral patch of 7 fathoms, situated in Latitude 7° 17′ S., and Longitude 118° 13′.8 E. From this patch the West point of Sarassa bears 332°, 6 miles distant, and the Northwest point of Pelokan 54°, the distance being somewhat over 9 miles. One seamile South of this patch, which showed discoloring water and tidal ripplings, a depth of 491 fathoms was found.

15. **Saleh Bay,** Sumbawa, North Coast. 14. II. 1900. (Stat. 312, and 313). In the channel between Sumbawa and Setonda and in Batahaai Channel, the Northern entrance to Saleh Bay, no dangers were seen. The reef extending from Peka Point seemed to be less extensive than shown on the chart. Setonda Island, 312 M. high, is surmounted by a circular ridge, which has quite the appearance of an ancient crater.

In the midst of the bay, 5 miles South of Peka Point, the lead showed 152 fathoms, black, sandy mud.

East of Pulu Dangar Besar a good anchorage was found in 15 fathoms, sand, shells and gravel, Ngali Point bearing 122°, the South point of Dangar Besar 250° and the Northeast point of Dangar Besar 342°.

For approaching this anchorage the following leading mark may be used: "A round summit in line with a conspicuous, green, treeless hill, with flat top", bearing 174°, the left side of this hill being then free from the left side of Lian Maja.

From the coral reef, $1^1/_2$ miles Northnorthwest from Dangar Besar, and separated from this island by a deep channel, the following astronomical bearings were taken:

Menangis Point	272°.5
South Point of Mojo Island	278°.7
Peka Point	15°.2
Most off lying rock near Ngali Point	128°.7
Extremities of Dangar Besar	142° and 196°

This reef extends about 600 M. North and South and 1000 M. East and West; it nearly entirely uncovers at low water. On the North side is a high ridge of dead coral and sand, which can be seen at a great distance.

16. **Bima Bay,** Sumbawa, North Coast. 8—12. IV. 1899. (Stat. 47). In the midst of the entrance of Bima Bay, Batu Putih bearing about East, depths of 178 and 164 fathoms were found, the bottom being sand and mud. It is very steep; one seamile South of this position the depth was 31 fathoms, coral bottom.

On the Western side of the outer bay an anchorage was found in 9 fathoms near to a point, North of which is a small, conspicuous bight.

The distance of the 3-fathom line was 170 M., the bearing of Vader Smit being 290°, that of the furthest land point to the Southward 171°.

Bima Creek is very narrow; the water is always muddy, so that fresh water can not be taken from it.

The bar uncovers throughout at low water. Cattle, pigs, fowl and fruit may be obtained here.

17. **Sapeh Strait and Bay,** Sumbawa, East Coast. 14. IV. 1899 and 12. II. 1900. (Stat. 49[a], 310 and 311). East of the bank with depths up to 40 fathoms, extending $3^1/_2$ miles off Toro Maru, the bottom is steep; one seamile further Eastward the lead showed a depth of 205 fathoms.

With ebb-tide, coursing from Sapeh Bay to the Northwestpoint of Gili Banta, a current

of $3^1/_2$ knots was experienced, accompanied by strong ripplings and eddies. In the middle of the Strait the direction of the current was to the Southeastward, nearer to Gili Banta Southsoutheast.

Sapeh Bay affords very good anchorage in each monsoon. The plan (13) on chart 118 is sufficiently correct.

Half a mile off Dumbia Point discoloring of the water was observed, which however proved to be caused by river water. The bordering reefs in the bay are generally well visible. The bar of the river is extensive and shallow; it is therefore difficult to obtain fresh water.

18. **Bay of Badjo,** Flores, West Coast. 16. IV. 1899. (Stat. 50). Passing the North coast of Gili Banta at a distance of one mile and that of Komodo at about 2 miles, and then between the rocky islet and the couple of small islands, situated East of the Gili Lawa Bay, no dangers were met with; until Sabajor Besar was passed no other dangers were seen than those shown on the chart. Further Eastward a reef was found, North of Pungu Island, the West point of this island bearing 196°, $1^1/_2$ miles distant, the South point of Salama Island 89°, these bearings being obtained from the South point of the reef. It extends 1.3 mile in a direction N. by E., and has a breadth of 0.4 mile. The depths are from 4 to 8 fathoms, with two patches of $2^1/_2$ fathoms.

The South point of this reef may be cleared by keeping the conspicuous white stone, which lies North of Sabajor Besar, fully its own length open from the Northernmost islet off Komodo.

The anchorage near Badjo village, about midchannel in 10 fathoms, sand, the South point of Badjo Island bearing 279°, is safe in each monsoon. Care however must be taken to have a clear anchor on account of the tidal currents.

A pearlshell fishery has its quarters at Badjo. Some provisions may be obtained here. Not far South of the village is a creek with a waterfall, the water of which is very good. It can however only be procured by using barrels or small native boats, on account of the bar being too shallow.

19. **Molo Strait,** Flores, West Coast. 18. IV. 1899. On the plan (18) on chart 118 the reefs North of Molo Strait, especially those between Bangkau and Gadoh Islands, are not shown correctly; caution is necessary. In clear weather these reefs can be seen at a sufficient distance. When passing Molo Strait at neaps a current of about 3 knots per hour was experienced in the narrows. In these narrows no dangers were seen.

20. **Madura Bay,** Molo Strait. 19. IV. 1899. (Stat. 51). This bay affords good anchorage for one ship of moderate size in 13 fathoms, mud and sand, the South point of the bay bearing 216°, the North point 325°. The space being limited mooring is recommended, especially on account of the circular current, which prevails in the bay and may foul the anchor. In strong Westerly winds there is a heavy sea in this bay.

21. **Mangrove Bay,** Molo Strait. 19. IV. 1899. In the circular inner part of this

bay, the conditions, depth included, are nearly exactly the same as those in Madura Bay. The shore on the Northern side of the outer bay is composed of white coral sand.

22. **Nangamessi Bay,** Sumba, Northcoast. 21. IV. 1899. (Stat. 53). The two white pyramids on Waingapu Point in line lead clear to the anchorage, the reefs moreover being marked by beacons.

The "Siboga" anchored in 17 fathoms, sand, the Northern Pyramid bearing 182°, Atu Point 100° and the West side of Waingapu Point 216°. It is however possible to anchor nearer to Waingapu Point in 12 fathoms, but there the danger of fouling the anchor is greater, on account of the irregular currents, caused by the creek in the Western bight.

The plan (1) on chart 119 is sufficiently correct. The Northcoast of Sumba is not correct on the charts; bearings do not agree. The Southeastpoint of the island extends 5 miles less than is shown on the chart. On the reef off this point two large wrecks were seen.

The Northern part of Sumba is composed all along of elevated ancient coral-terraces. The "Tafelberg" or Gunung Data can not be made out from the offing, as it is only a part of such a terrace, standing alone between two ravines, with another and higher terrace in the background.

Provisions may be obtained; also fresh water by means of boats.

23. **Seba Anchorage,** Savu Island. 25. IV. 1899. (Stat. 58). This anchorage is open to the Northwest. The "Siboga" anchored in 9 fathoms, sand, the extreme point of Savu bearing 14°, the White pyramid 139° and the West point of Savu 233°.

The inhabitants have constructed low walls of coral stone on the coast-reef. The ponds thus formed, when dried up at low water, retain lot of fishes, crabs, etc., which are then easily caught by the inhabitants. This is their only way of fishing, as they have no boats whatever. The only available landing place is near the pyramid, there being a channel in the reef. Fresh water is nearly not obtainable.

24. **Timor Kupang,** Timor, West Coast. 28. IV. 1899. The "Siboga" anchored in 12 fathoms, mud and sand, Kupang Lighthouse bearing 123°, the North point of Samau Island 282° and the East point of Kera Island 343°. At low water landing is difficult. At high water boats may enter the creek by keeping close to the rock on the West side of the entrance. In the West monsoon landing is often dangerous. In the East monsoon the wind P. M. often shifts to the North, in consequence of which landing becomes also difficult on account of the surf.

Good provisions and very good fresh water may be procured. The latter is brought alongside in barrels of 300 Liters, the price being *f* 4,50 for 1000 L.

25. **Haingsisi,** Samau Island. 26. IV. 1899 and 2. II. 1900. (Stat. 60 and 303). A government coal store is established here. Coaling is done with boats at the rate of 60 tons a day. At low water it must be stopped on account of the reef, which uncovers. This anchorage offers good shelter in the West monsoon, although even in this monsoon heavy

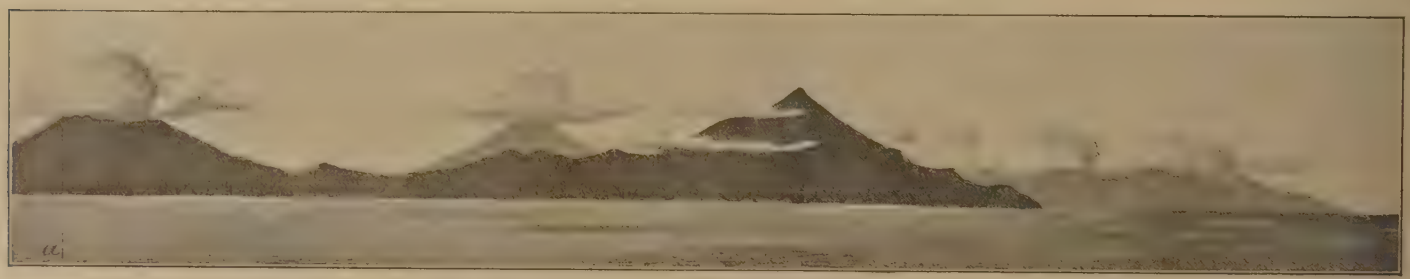
squalls from the Southeast may be experienced, which however do not raise much sea. In the East monsoon coaling is sometimes difficult on account of the sea.

Ships must anchor in 15 to 20 fathoms or more, coral bottom, the depths decreasing rapidly towards the shore. The flood-stream, which lasts longer than the ebb-stream, has an Easterly direction on the anchorage and then sets strongly to the Northward between Samau and Timor. The reef off the East point of Samau is generally well visible. If the weather does not permit landing at Kupang, ships staying at Haingsisi may communicate with Kupang by sending their boats to Talot village on the Eastern shore of Samau strait, from where Kupang can be reached in one hour and a half by a footpath, which however is rather stony.

26. **Lomblen Island.** 6. II. 1900. Plate IV. (Stat. 304). This island is mountainous and has several conspicuous tops. On the South coast, to the Southeast of mount Lamararap, the village bearing this same name is situated, the inhabitants of which profess whalefishing. There is no anchorage. Half a mile East of Lamararap the coast forms a low rocky point, East of which it bends inward over a distance of several miles; in this bight is the village of Laballa, where, according to the natives of Lamararap, ships may find anchorage.

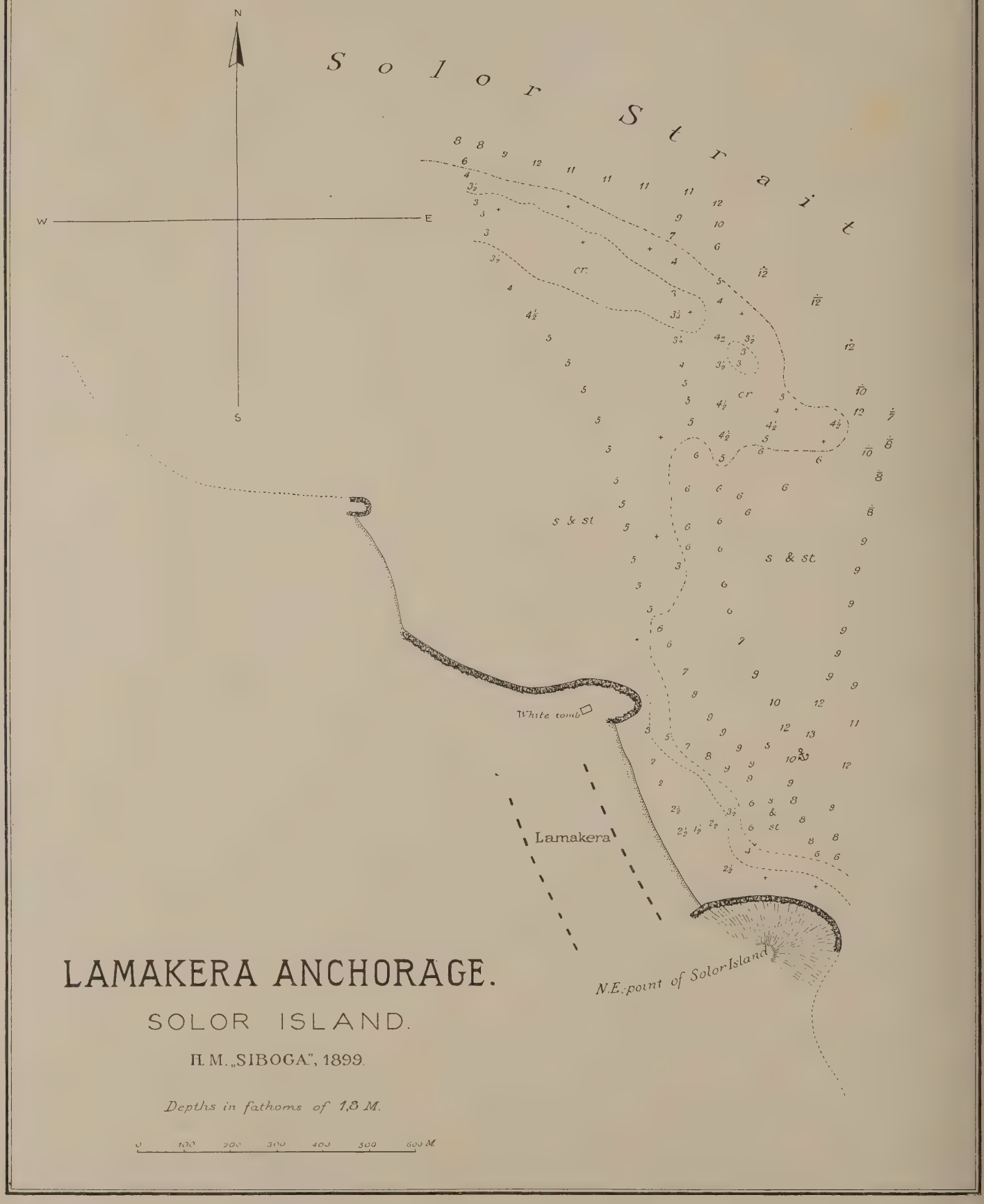
West of mount Lamararap the coast also trends inward over a considerable distance, forming sandy beaches. This coast is well populated and cultivated.

N.E. Point of Solor Island. Lamakera Strait. S.W. Point of Lomblen, N. 9° E. Mount Boleng, Adonara.



Mount Lamujong. Gunung Api (Mount Lowotolo). Mount Lamararap N. 40° E. S.E. Point of Lomblen.

Pulu Soangi, a rocky islet, 52 M. high, stands about half a mile distant from the coast. When passing Soangi at a distance of two miles no reef could be seen bordering it. According to informations obtained from the natives the passage between Soangi and Lomblen is free from dangers.



LAMAKERA ANCHORAGE.

SOLOR ISLAND.

H. M. „SIBOGA", 1899.

Depths in fathoms of 1,8 M.

Mount Lowotolo on the North coast of Lomblen is 1420 M. high; the natives asserted it to be an active volcano.

Steering for Lamakera Strait from the Southward it is not easy to make out the islands and mountains, when they are seen for the first time. When at a distance of 20 to 25 miles South of the Strait, the 588 M. high and steep Southwestern part of Lomblen appears detached from the rest of this island, the land between being low. Mount Lamujong and mount Lamararap, respectively 1042 and 1638 M. high, are both conical.

Mount Boleng on Adonara Island, 1640 M. high, is then in line with the Southwestpoint of Lomblen. The rest of Adonara, which is high everywhere, is seen over Solor Island, of which, at this distance, only Mount Geriwatu and the top near the Southwestpoint can be distinguished.

From this position Pantar Island is invisible, but the volcano in the Eastern part of Alor Island may be seen in clear weather.

27. **Lamakera,** Solor Island. 1. V. 1899 and 6. II. 1900. Plate II (Stat. 61 and 304). Lamakera, situated on the Northeast point of Solor, is a large and densely populated village. Its inhabitants and those of Lamararap are the only natives in the Indian Archipelago, which nowadays profess whalefishing.

A good anchorage was found in 11 fathoms, coral and sand, close to the Northeastpoint of the island, this point bearing 161°, the flagstaff of the Rajah 231° and the furthest visible point to the West 300°.

To the North and Northwest of this anchorage a reef extends, the outer part of which, having no less than 3 fathoms of depth at a distance of about 700 M. from the shore, is nearly parallel to it.

Outside this ridge the depths gradually increase, but on this side a ship should not come within a distance of 1000 M. from the shore. To clear the East point of the reef the extreme Northeastpoint of Solor should be kept bearing West of S. by W., the second point to the Southward then being visible. According to the natives vessels of moderate draught might pass between the reef and the shore, the depths there being not less than 4 fathoms. On the first point North of Lamakera village there is a conspicuous white tomb; this point bearing W. N.W. will lead to the anchorage. Some provisions and spermaceti-oil may be obtained at Lamakera.

No other dangers were seen in Solor-Strait. The Government official ("Posthouder") of Solor has his residence at Menanga. The old fort at Lawajang, shown on the plan of this anchorage, still exists.

28. **Lobetobi-Strait,** Flores, East Coast. 8. II. 1900. (Stat. 306). The "Siboga" anchored in 14 fathoms, sand and coral, the furthest visible point of Flores bearing 227°, Kambing or Hoog Island in line with Eastern Djongo Island 180°, and the Southern limit of red bluff on Solor Island 110°.

The floodstream, running to the Northward, had a velocity of $2^1/_2$ knots, the ebbstream,

running to the Southward, somewhat less. As far as could be observed, when passing these channels at night, the passage East of the Djongo Islands and that between these islands and Kambing or Hoog Island, were clear of dangers.

Both the tops of Mount Lobetobi, the Southeasternmost being broad and round, the other having an open conical top, are active volcanoes.

In the narrows of Larantuka Strait, although the tides were at neaps, a very strong current was experienced.

29. **Adonara Island.** 2. V. 1899. (Stat. 61a). Anchorage was found in 17 fathoms, coral bottom, off Adonara village on the Northcoast, Serbete Island bearing 334°, Larantuka Strait 229°, Entrance of Creek 160°, and the North point of Adonara 57°, close to the steep edge of the reef, which extends a considerable distance from the shore and shows discoloring water. Only little can be seen from the village; the flagstaff has disappeared.

30. **Russa Linguette,** Flores, North Coast. 3. V. 1899. This island has only a height of 283 M., instead of 583, as shown on the chart.

31. **Cornelia Roads,** Kalao Tua Island. 3. V. 1899. These roads afford a bad anchorage, especially in the East monsoon, the bottom being very steep. The "Siboga" anchored in 30 fathoms, coral bottom, the Southeastpoint of Kalao Tua bearing 54°, a conspicuous hill 298°, and the South point of the island 240°.

Possibly a better anchorage may be found on the West side of the South point of the island, where a small bay was seen in which a village with a great number of native boats.

To prevent mistakes, when navigating in this neighbourhood, it should be remembered that Kalao Tua, which has a height of 518 M., is sighted long before Madu, which is only 120 M. high, becomes visible.

32. **Kambaragi Bay,** Tanah Djampeah. 4. V. 1899. (Stat. 64). A good anchorage was found in 10 fathoms, mud, the furthest visible point to the Northward bearing 352°, the furthest visible point to the Southward 162°, and the White Rock 256°.

Only a few houses were seen in the Northeastern cove. From a creek fresh water may be procured, when availing oneself of the tide. A large village with a numerous population is situated on an islet called Katela, North of the channel, which forms the Northern entrance to Kambaragi Bay, which channel is only available for boats. The native chief, whose title is Punggawah, lives here. The anchorage on the Southeast side of Katela, according to the information of the natives, may be used by vessels. The name Pulu Pandjang, shown on the chart, should be Pulu Melala. In Katela some provisions may be procured.

The reefs, shown as "Vesuvius- en Etna-droogten" on the Dutch charts, are called Lana Pomali by the natives.

Discoloring of water was observed in the passage between Pulu Sisir and Pulu Bimbee,

West of Tanah Djampeah, when on the line "Rusah Island open to the right of Sisir", the distance from the latter being somewhat less than that from Bimbee.

33. **Saleyer Island.** 26. IX.—26. X. 1899. (Stat. 213). The East Coast of this island is steep-to nearly everywhere. North of Pinang Point anchorage was looked for without success. Information was obtained that there is nowhere anchorage on this coast, except at Pamatati, close to the Eastward of the Northpoint of Saleyer.

The Westcoast is less steep. In the Western entrance of the channel between Saleyer and Pamatata (also called Pulu Pasi Tanette or South Island), anchorage was found in 28 to 30 fathoms, sand, the Westpoint of Pamatata bearing 13° and the outer visible point of Saleyer 111°.

Strong currents and eddies were experienced here. The Northern extremity of Saleyer is of moderate height with a straight outline. From some distance it looks like a separate island, on account of its being connected to Saleyer by a low border of land.

About 8 miles South of the North point of Saleyer, at a point where the hills rise with a steep slope, stands a conspicuous square clump of trees, 350 M. above the sea-level in lat. 5° 52′.8 S., and long. 120° 30′.8 E.

From the offing it is visible in all bearings between N.E. by N. and West. When coming from the Eastward another similar clump may be seen, situated further Southward.

Saleyer is a prosperous island, but it has the reputation of being unhealthy.

Saleyer Roads. When steering for Saleyer on an Easterly course, the reef, extending from the Northpoint of Pulu Pasi, may be cleared by taking course 110° on some conspicuous white spots, situated on either side of a ravine, which breaks the outline of the coast at about 2 miles North of Saleyer village.

The reefs between Pasi and Saleyer are marked with beacons. The low, wooded point of Saleyer on with the somewhat higher Southeastpoint of Pasi will lead between Pasi and the reefs on the North side of the anchorage. When on this course the flagstaff of Saleyer village is seen bearing E. by S., it is steered for. The "Siboga" anchored in 6 fathoms, mud, the Flagstaff bearing 101°, and the extreme coco-trees 183°.

In strong Westerly winds there is a heavy sea; steamers then anchor near Pasi Island, on which passengers are landed in order to pass the channel in its narrowest part, which is situated more to the Southward.

34. **Bank South of Saleyer.** 7. V. 1899. (Stat. 66). On the bank between Bahuluang and Tambolungang Islands, marked on the chart with 4 and 5 fathoms, the "Siboga" anchored in 5 fathoms close inside the Eastern edge, Apatana Point bearing 52°, the West point of Bahuluang 343° and the East point of Tambolungang 175°.

In sounding athwart this bank in a Westerly direction, not less than 3 fathoms of depth was found. In this direction the bank measures 2400 M.; both sides are steep-to.

On account of the peculiar nature of the bottom, calcareous algae and dead coral, the

discoloring of the water on this bank is so strong in clear weather, that the depth would be thought to be some feet only. The tidal currents were observed to run over the bank in an Easterly and Westerly direction with a velocity of at least 2 knots per hour.

As seen from the masthead the discoloring of water appeared to extend till Tambolungang Island.

35. **Dongala Anchorage,** Palos Bay, Celebes, West Coast. 18. VI. 1899 (Stat. 86). This anchorage offers only a limited space, the bottom being steep. A good position is in 15 fathoms, mud, the North point of the bay bearing 341° and the flagstaff of the Government official ("Gezaghebber") 231°. The reefs on either side of the anchorage are marked by beacons.

Dongala is the chief port for the extensive trade of Palos Bay. The steamers of the "Koninklijke Paketvaart" touch here regularly; other steamers entertain a direct communication with Singapore.

At the other anchorages in Palos Bay the bottom is still steeper and the depths greater than here.

36. **Kaniungan Islands,** Borneo, East Coast. 21. VI. 1899. (Stat. 89). A couple of miles North of Kaniungan Ketjil, Southwest from the position, where the chart shows a depth of 25 fathoms, 157 fathoms were found, the Eastpoint of Kaniungan Ketjil bearing 176°, Budja Point 287° and Mataka 9°. From here the depths decrease rapidly towards the Kaniungans; all around these islands good anchorage is to be found.

37. **Muaras Reef,** Borneo, East Coast. 22. VI. 1899. (Stat. 91). The "Siboga" anchored in 15 fathoms, coral bottom, the Westpoint of Palabangan bearing 29°, the Eastpoint 47°, and the Southpoint of Sambit 88°. The bottom at this anchorage was clearly visible. A strong current was experienced here, running to the Northward.

The plan of Muaras Reef was stated to be correct as for the Southern part; the Northern part was not visited.

38. **Pearl Bank,** Sulu Archipelago. 27. VI. 1899. Plate IV. (Stat. 96). From bearings and angles, taken by sextant, it was concluded, that the position of the Dokkan group, relatively to that of the Pearl Bank, is not shown correctly on Adm. Chart N^{0} 928. Those islands should be placed 2′,8 miles more to the Westward. As to the position of these groups, with regard to the other islands of the Sulu group, no accurate observations could be got, except a compass bearing of one of the Tawi Tawi mountains, from which it was concluded to be very probable, that the position given to the Pearl Bank is correct.

When navigating and at anchor in the surroundings of the following islands, viz. Bongao, Pearl Bank, North Ubian, Sulu, Kapul and Tonkil, no other important discrepancies in the harts and pilots were noted.

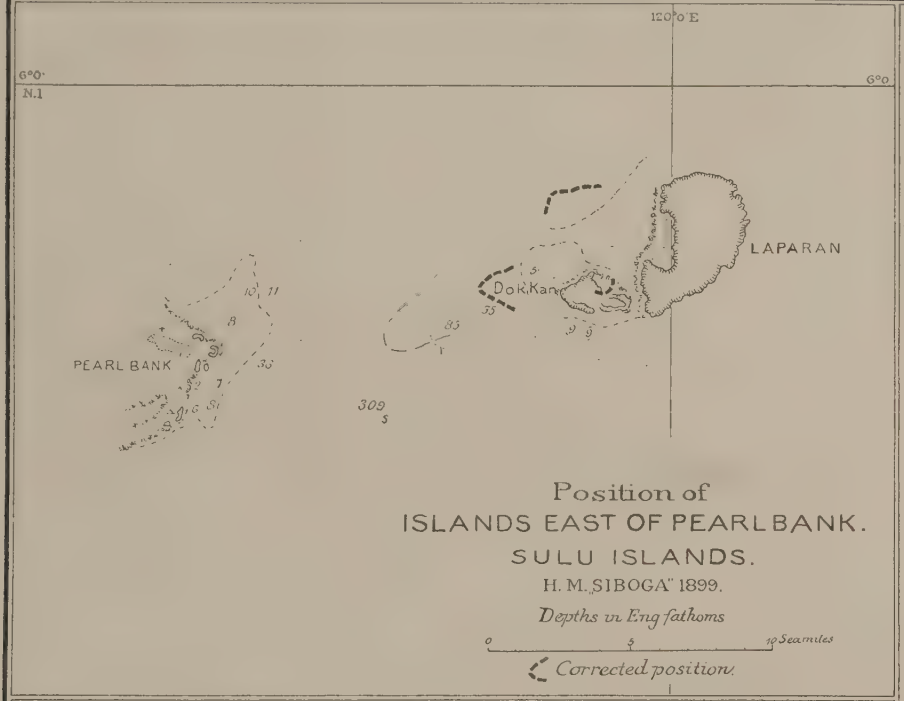
SAWAN ANCHORAGE.

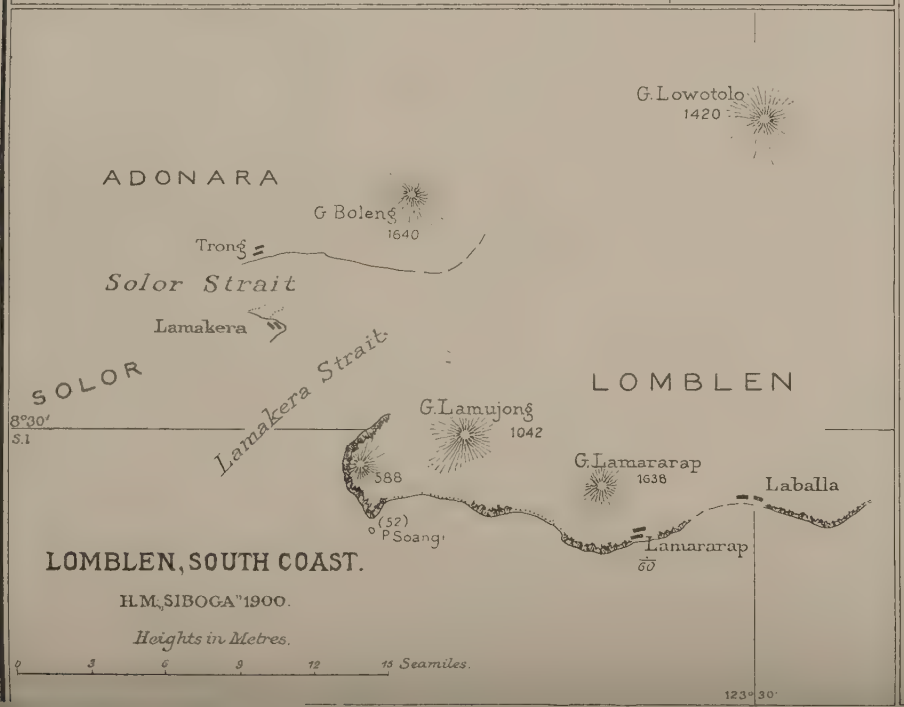
SIAU ISLAND.

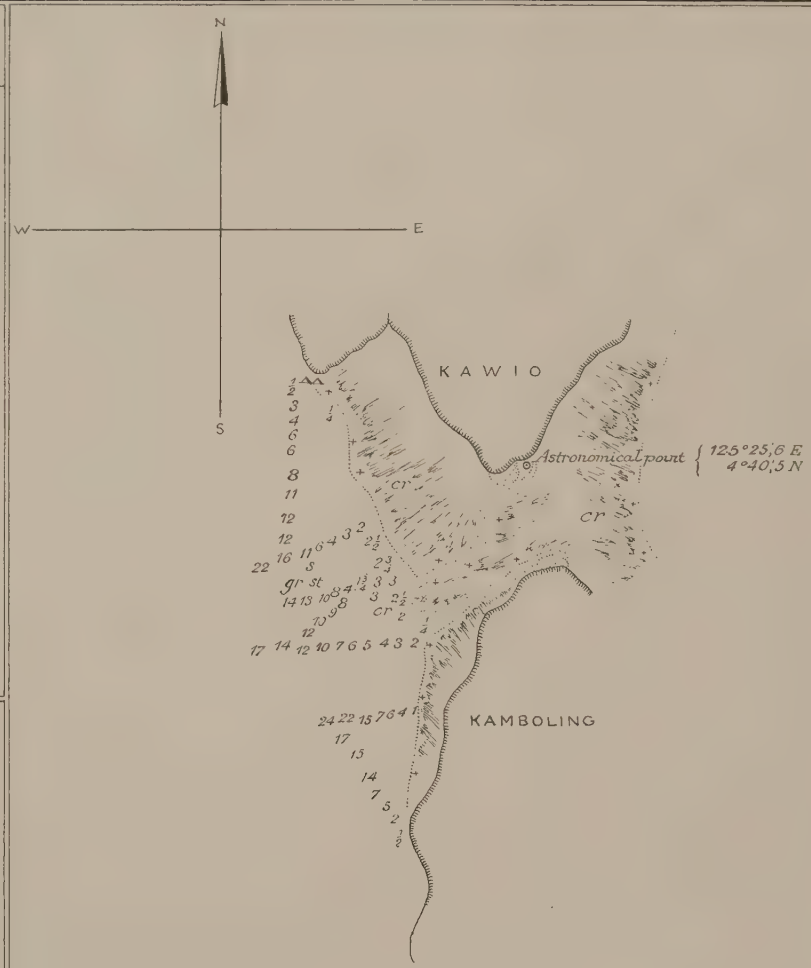
SANGIR ISLANDS.

H.M. „SIBOGA" 1899.

Depths in fathoms of 1.8 Metre.


120°0' E
6°0'
N.1
6°0
LAPARAN
Dok Kan
PEARL BANK
309
Position of
ISLANDS EAST OF PEARLBANK.
SULU ISLANDS.
H. M. SIBOGA" 1899.
Depths in Eng fathoms
0 5 10 Seamiles
Corrected position


G. Lowotolo
1420
ADONARA
G. Boleng
1640
Trong
Solor Strait
Lamakera
SOLOR
Lamakera Strait
LOMBLEN
G. Lamujong
1042
8°30'
S.1
588
G. Lamararap
1638
Laballa
(52)
P Soang
Lamararap
60
LOMBLEN, SOUTH COAST.
H.M. SIBOGA" 1900.
Heights in Metres.
0 3 6 9 12 15 Seamiles.
123°30'


N
W
E
S
KAWIO
Astronomical point
125°25,6 E
4°40,5 N
KAMBOLING
KAWIO ANCHORAGE.
KARKARALONG GROUP.
SANGIR ISLANDS.
H.M. SIBOGA" 1899.
Depths in fathoms of 1.8 Metre.
0 200 400 600 800 1000 1200 1400 M.

39. **Biaru Island.** 17. VII. 1899. (Stat. 123). The "Siboga" anchored in North Bay in 6 fathoms, the red topped islet bearing 174°, the highest point of Biaru 171°, and the extremities of the bay 70° and 292°, the distance from the reef being about 200 M.

The chart of this bay, Eng. Adm. N° 2193, was not on board.

40. **Sawan Anchorage,** Siau Island. 18. VII. 1899. Plate III. (Stat. 125). Anchorage was found in 15 fathoms, sand and stone, 200 M. distant from the reef, a land point bearing 2°, the pasar building (a large open shed) 280° and a small isolated rock 132°. Especially in the East monsoon, when the wind is often Southerly, this anchorage affords better shelter than that of Ulu, the chief place of the island, the bottom there being steeper and the swell higher. The isolated rock, above mentioned, is situated on a rather extensive reef, stretching from Timokolang Point, the Southeast point of the island. Some cables North of Burias Island (called Gunatin on the chart) some rocks are lying, the tops of which are a few feet above the water level.

The island South of Burias is called Pahepa by the natives. Siau Island is densely populated, the number of inhabitants amounting to 24000.

Pigs and fruit are abundant, fowl and eggs scanty.

41. **Taruna Bay,** Great Sangir Island. 20. VII. 1899. (Stat. 127). A narrow bay with great depths, open to the Westward. As there are no dangers outside and no current inside there is no difficulty in entering, even at night, when the weather is clear. When at a distance of 5 miles W. S.W. from Taruna Bay, the night being bright with moonlight, both this bay and Manganitu Bay could clearly be distinguished, the latter being by far the larger.

The "Siboga" anchored in 30 fathoms, sand, Borakin Point bearing 223°, North point of bay 270°, Flagstaff of Government Official ("Controleur") 329°, and land point East of village 37°.

The bottom being steep and composed of rather loose sand, this anchorage is not safe in strong Westerly winds. Even with Easterley wind there is as a rule some swell in this bay. Taruna is the residence of the Controleur of the Sangir and Talaut Islands.

Gunong Abu. The highest top of this volcano, a flat cone of ashes, 1860 M. above the sea-level, is situated nearly 2 miles E. N.E. from the position shown by the charts, viz. in lat. 3° 39'.5 N. and long. 125° 26'5 E.

42. **Kawio Anchorage,** Karkaralong Islands. 22. VII. 1899. Plate IV. (Stat. 129). The island shown as Meares on the charts, consists of two islets connected by a coralreef, which uncovers at low water. The Northernmost is called Kawio, the other Kamboling. Anchorage, which however does not offer shelter against Westerly winds, may be found near the Western edge of the reef, in 20 fathoms, coralsand and coral, the Southwestpoint of Kamboling bearing 155°, the Northpoint of same 73°, the Southpoint of Kawio 53° and the Westpoint of this island 4°; also somewhat nearer in 15 fathoms, same bottom, the Westpoint of Kawio bearing 357° and the Southpoint of same 57°.

West of these islets, on which some thirty natives abide, within a distance of 2 miles, strong eddies were observed, probably caused by irregular depths. Except the bordering reefs, of which that on the Northwest side of Kawio extends 0,3 mile and uncovers at low water, no traces of dangers were observed West of the islands, although dark patches of discoloring water were observed within a mile of the anchorage. These however may be seen even when the depths are not less than 10 fathoms, for on the anchorage dark brown patches of coral could be distinguished on the white sand bottom even in depths of 13 and 15 fathoms.

Southsouthwest from Kamboling and within a distance of 2 miles strong ripplings and eddies were observed, which may be caused by the ridge of the Southwestpoint of the island continuing under water. Caution therefore is necessary in this neighbourhood.

From an astronomical bearing taken from the South point of Kawio and from compass bearings during the voyage it was concluded that the position of Anda and Armadores Islands is 2'.5 miles more Northerly and $^1/_2$ or 1 mile more Westerly than shown on the chart. These islands were called by the natives Matu Tuwang and Mamanuk respectively; Ariaga is called Maròrè by them.

The longitude of the Southpoint of Kawio was stated to be 125°25'.6 E.

43. **Beo Anchorage,** Karakelang Island. 24. VII. 1899. (Stat. 131). The "Siboga" anchored in 7 fathoms, mud and sand, the extreme point to the Southward bearing 223°, the nearest landpoint (marked *a* on the plan) 197°, the flagstaff 167° and the river-entrance 141°.

The bottom on the anchorage is rather steep, close outside the depth being 20 fathoms and more. After the ship had turned her stern to the shore the lead showed $3^1/_4$ fathoms aft, it being low water of spring at the time.

The bay is open for winds and swell from S.W. to N.W. On the plan of this bay on Chart. N° 143 the scale is erroneously given as 1 : 1.000 instead of 1 : 10 000.

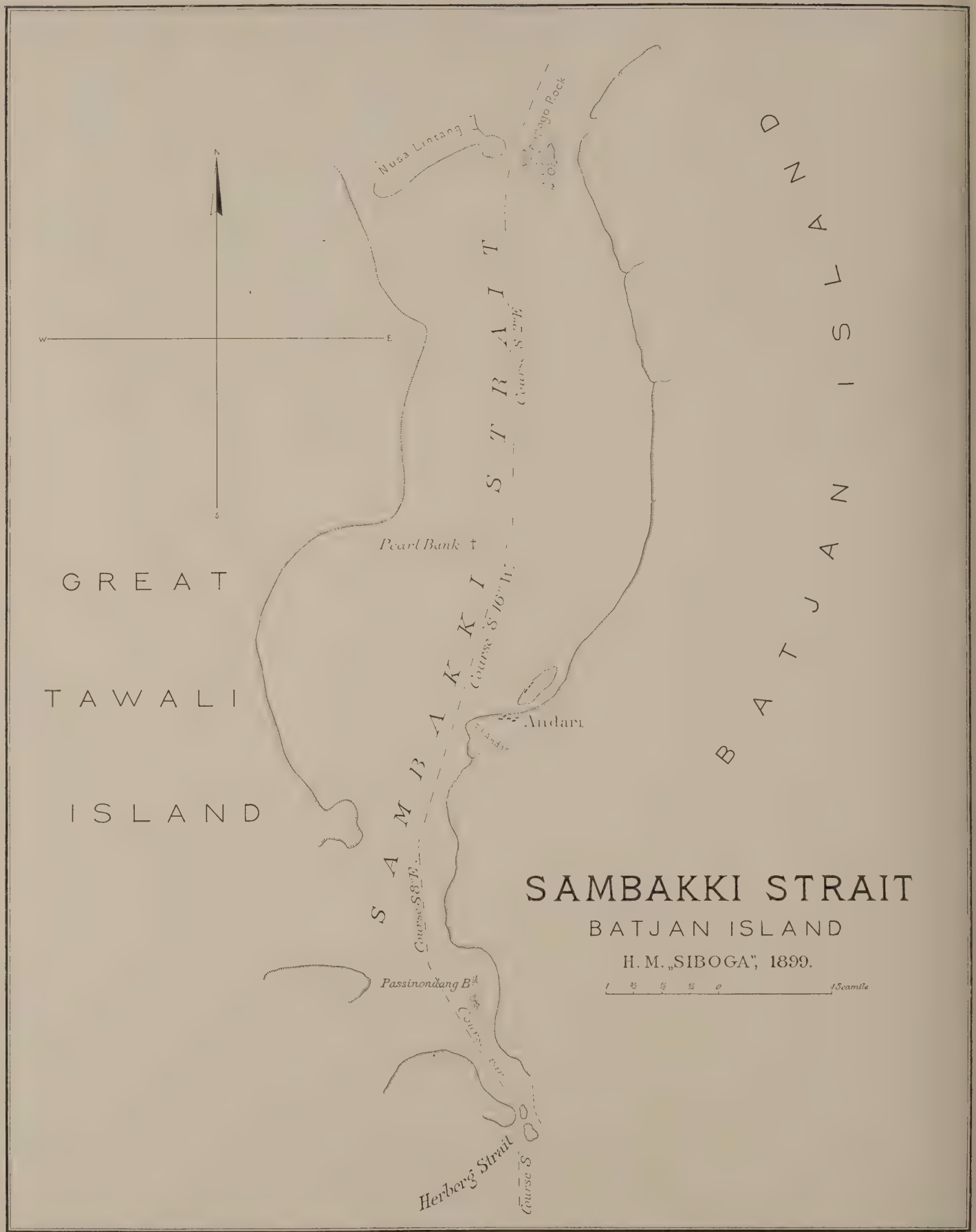
44. **Lirung Anchorage,** Salibabu Island. 25. VII. 1899. (Stat. 133). The ship anchored in 17 fathoms, mud, sand and stones, the flagstaff of the "Posthouder" bearing 198°, the Northwestpoint of Saha Ketjil 49° and that of Saha Besar 77°. This anchorage is good in all seasons; in N.W.- and N.E.-winds there is a moderate swell. The best landingplace is in front of the Posthouders house on a sandy beach, which at this point is clear of stones.

Some supplies may be obtained here.

In navigating the channel between Karakelang and Salibabu a reef of some extension was seen projecting from the Eastcoast of Salibabu, and another from the South point of Karakelang, the discoloring of which stretched a considerable distance towards Saha Ketjil.

45. **Ternate.** 29. VII. 1899. (Stat. 136). A red light is shown on the Northern pier near the Resident's house.

In 1899 a new coaling pier was building. Coursing from Ternate Southward between Halmaheira and the islands no discrepancies of importance were found in the charts.


N
W
E
S
Nusa Lintang
Pearl Bank †
GREAT
TAWALI
ISLAND
SAMBAKKI STRAIT
Course S.8°E.
Course S.16°W.
Course S.8°E.
Andari
BATJAN ISLAND
Passinondang B.
Herberg Strait
Course S. 0°
SAMBAKKI STRAIT
BATJAN ISLAND
H. M. „SIBOGA", 1899.
1 ½ ½ ¼ 0 15 miles

46. **Kajoa Island.** 3. VIII. 1899. (Stat. 138). In the bay South of the Northeastpoint the "Siboga" anchored in 37 fathoms, coral bottom, the Northeastpoint of the island bearing 14°, the Southpoint of the bay 142° and the apex of Makjan Island 346°.

Some creeks but no villages were seen. The island is scantily populated and cultivated. Coursing Southward the coastline was found to have a more Southerly direction than noted on the chart. The reef off the Southpoint was clearly visible; it does not extend far. Between the islands South of Kajoa many shallow reefs were seen.

47. **Sambakki Strait,** Batjan Island. 4. VIII. 1899. Plate V. The channel between the islands of Batjan and Great Tawali, which on the charts bears the name of Herberg Strait, is properly called Sambakki Strait, while the other name only belongs to the very narrow passage about 4 miles South of Andari village.

On approaching this Strait from the Northeastward the Northeastern part of Great Tawali, being a peninsula, looks like a separate island of the same size as Little Tawali, which is then a few miles to starboard. The Strait is entered on a S S.W. or Southern course. The entrance has a breadth of about 300 M., and is the widest of the channels between the islets in the entrance, leading midway between Talipogo Rock on the Batjan side and Nusa Lintang on the other side. From the rock, which is grown with trees, 50 M. reef project in the channel; Nusa Lintang has no bordering reef.

South of this passage the Strait has a width of about 2.5 miles over a distance of nearly 6 miles, then gets narrower.

Having made 4 miles in a course 178° or some degrees less, the shallowest patch of Pearl Bank bears about West, 0,2 mile distant. This bank, which is marked by a pole with cross, was well visible by discoloring and stream-ripplings.

The point West of Andari village may be passed at a short distance; also the 2 miles of Batjan coast, which then follow, the course then being 164°. Hence the course becomes more Easterly, until S. S.E. and S.E. between Passinondang Bank and Herberg Strait. This bank which must be kept on the portside at a distance of largely 0,1 mile, uncovers at low water; on the outer edge there is a small cluster of mangrove trees. To pass Herberg Strait, when coming from the Northward, it is advisable to keep midchannel until it is well open, nearley bearing South, which is the course in this passage. It is only about 80 M. in breadth. Both sides are steep-to.

After passing the second rocky islet on the port hand, the course is altered until parallel to the general direction of the Batjan shore. For vessels of moderate size (up to 800 tons displacement) the navigation of Herberg Strait offers no difficulties, but it should be remembered that it is safer to go against the tide, and that coming from the Northward requires more caution than going in an opposite direction. On approaching Pulu Obit it is recommended to keep the Batjan side of the channel.

48. **Batjan Bay,** Batjan Island. 4. VIII. 1899. (Stat. 140). The "Siboga" anchored in $7^1/_2$ fathoms, mud and sand, the flagstaff bearing 347°, the nearest point Southward 175°

and the nearest point Westward 272°. The space is much limited by the presence of a large wreck, lying there over twenty years.

When coming from the Westward the Westpoint of the bay should be given a good berth.

Batjan is the residence of a "Controleur" and of the "Batjan-Company". Some supplies may be obtained.

49. **Laiwui,** Obi Major. 5. VIII. 1899. (Stat. 142). The figuration and position of Tapat and Bisa islands and of the Northcoast of Obi Major are not given correctly on the charts. The course between the Southwestpoint of Bisa and Laiwui is 113°. A good anchorage was found in 13 fathoms, mud, the flagstaff on the pier bearing 133°, the Northpoint of Pulu Kadera 241° and Pulu Telor or Laiwui 270°. The hills of Tapat are visible over those of Bisa but not outside this island.

Between Tapat and Bisa a strong current and eddies were observed with some discoloring of the water; the lead however could not reach the bottom at 100 fathoms.

Narrow reefs were seen extending from the Southwestpoint of Bisa and from the two points to the East of it.

On Pulu Telor there is only one tree, which can be sighted at a considerable distance. Before this tree bore South course was held on Sambiki Island, until the flagstaff of Laiwui bore S.E.; then this was steered for, until Pulu Kadera still opened by its own breadth from the point South of the village, when the anchor was dropped, the distance of the 5-fathoms-limit then being 200 M.

About 1000 M. North of the village there is a creek with very good fresh water. Laiwui is the residence of the "Obi-Company".

According to the natives the channel between Obi-Major and Bisa, East of Laiwui, is dangerous, which statement agrees with the chart.

The range of mountains on Obi Major reaches a height of about 1500 M.; it gradually diminishes in height towards the East part of the island, which is flat and low East of the meridian of 128° longitude.

Bisa is a long and narrow island, highest (465 M.) in the Western part. Tapat is 540 M. high.

The position of the house, next to the pier at Laiwui, was stated to be in latitude 1° 19′.8 S. and longitude 127° 36′.3 E.

50. **Salo (Damar)-Group.** 7. VIII. 1899. (Stat. 144). The Five Islands consist of at least seven small and low coral islands, the diameter of the group being about 3 miles in both directions N. to S. and E. to W. They are visible at a distance of about 14 miles. 8 Miles West of this group slightly discolored water was seen, which, according to a native captain, who for many years sailed these seas, is always observed there, although there is no shallow water in that locality. On account of the ripplings, which were seen at the same time, it is probable however that moderate depths and steep slopes on the bottom, in concurrence with the current, are cause of the fact, the latter then bringing to the surface the water of the deep.

KATINAI ANCHORAGE.

SALOMAKIËE ISLAND.

DAMAR GROUP.

H.M. „SIBOGA", 1899

Depths in fathoms of 1.8 M.

0 90 180 270 360 450 900 Metres

View I.

N. point Salomakiëe
N. 290° E.

Doworra is hilly, the highest top being 330 M., which seen from the Eastward is the highest peak of a saddle.

Great Geelmuiden or Woka is flat and low, with the exception of one hill situated somewhat North of the centre. This hill, 120 M. high, has the shape of a flat, regular dome.

Hassil. Great Geelmuiden.
Part of Damar Group, seen from the Northwest.

Little Geelmuiden is flat throughout, Hassil hilly, being 230 M. in height.

Salomakiëe or Damar Island (Plate VI) is hilly but low in the middle, so that at a distance it appears like two separate islands. It is 170 M. high; the islet South of it is lower. From the North coast of Damar a reef extends, on which several coral islets. North of these is another islet, Katinai, not connected with the reef. The "Siboga" anchored not far from it in 25 fathoms, coral bottom, the Northwestpoint of Damar bearing 276°, a small white beach 234°, and the extremities of Katinai 145° and 123°, the shortest distance from the reef Southwest of this anchorage then being 300 M.

A ship might also anchor nearer to Katinai in 22 fathoms, where there is better shelter against swell from the Eastward. The islet, situated W.S.W. of Katinai, bearing on a S.S.W. course, will lead to this anchorage, from which the extreme Northpoint of Damar is seen exactly on with the saddle of Doworra. The distance from the reef is here also 300 M.

51. **Widi Islands.** 9. VIII. 1899. (Stat. 146). This group, erroneously called Weda Islands on the chart, is composed of two separate extensive reefs, both surmounted by numerous coral islets. Between these islets ponds of deep water were seen. In the Eastern group the Easternmost island is highest, the tops of the trees being 55 M. above the water level. Anchorage was looked for without success on the Northeast side of this group, the lead showing 77 fathoms at a distance of only 100 M. from the reef. About two miles North of this position a sounding of 284 fathoms was obtained.

The island Vaarwel, a small coral islet, 50 M. high, lies isolated but nearer to the Eastern group than it is shown on the chart.

52. **Fau Anchorage,** Gebé Island. 10. VIII. 1899. (Stat. 149). The "Siboga" anchored near the North point of Fau in 17 fathoms, coral bottom, the outer visible point of Gebé bearing 273°, a small creek North, the North point of Fau nearly in line with the furthest visible point of this island 142°, and the West point of Fau 219°. Afterwards the ship anchored East of the Northpoint of Fau, having this point nearly in line with the furhest visible point of Gebé, and the entrance of the lagoon bearing S. $^3/_4$ E.

The plan of Fau Harbour by Duperrey from 1819, (12) chart 149, may still be used, although some changes have taken place. The passage between Gebé and the isolated reef West of Fau is nowadays decidedly better than that between this reef and Fau, a reef having grown from Fau, which narrows the Southern entrance of the latter channel. The isolated reef mentioned above was distinctly visible; the Northeastpoint, which uncovers, was marked by two poles. By following the coast of Gebé at a distance of 200 to 300 M. this reef is cleared. In accordance with the information given by the Adm. Pilot, the depths between Fau and Gébé were found to be only 12 to 13 fathoms instead of 16. The reefs East of Fau seem all to have grown more extensive, so that, without special care, the channels on this side are scarcely navigable. When passing that nearest to the Fau shore the shoalest spot, 3 fathoms, was found when the top of Fau was seen over the East point of this island.

The figuration and general direction of Gebé are not given correctly on chart N° 145, the Northwestern part being about 2 miles more to the S.S.W. The promontory, situated about $2^1/_2$ miles West of Fau bears 278° from the Northpoint of this island, as is rather accurately shown on the plan. This promontory, seen from the N.W., projects far its steep and round extremity.

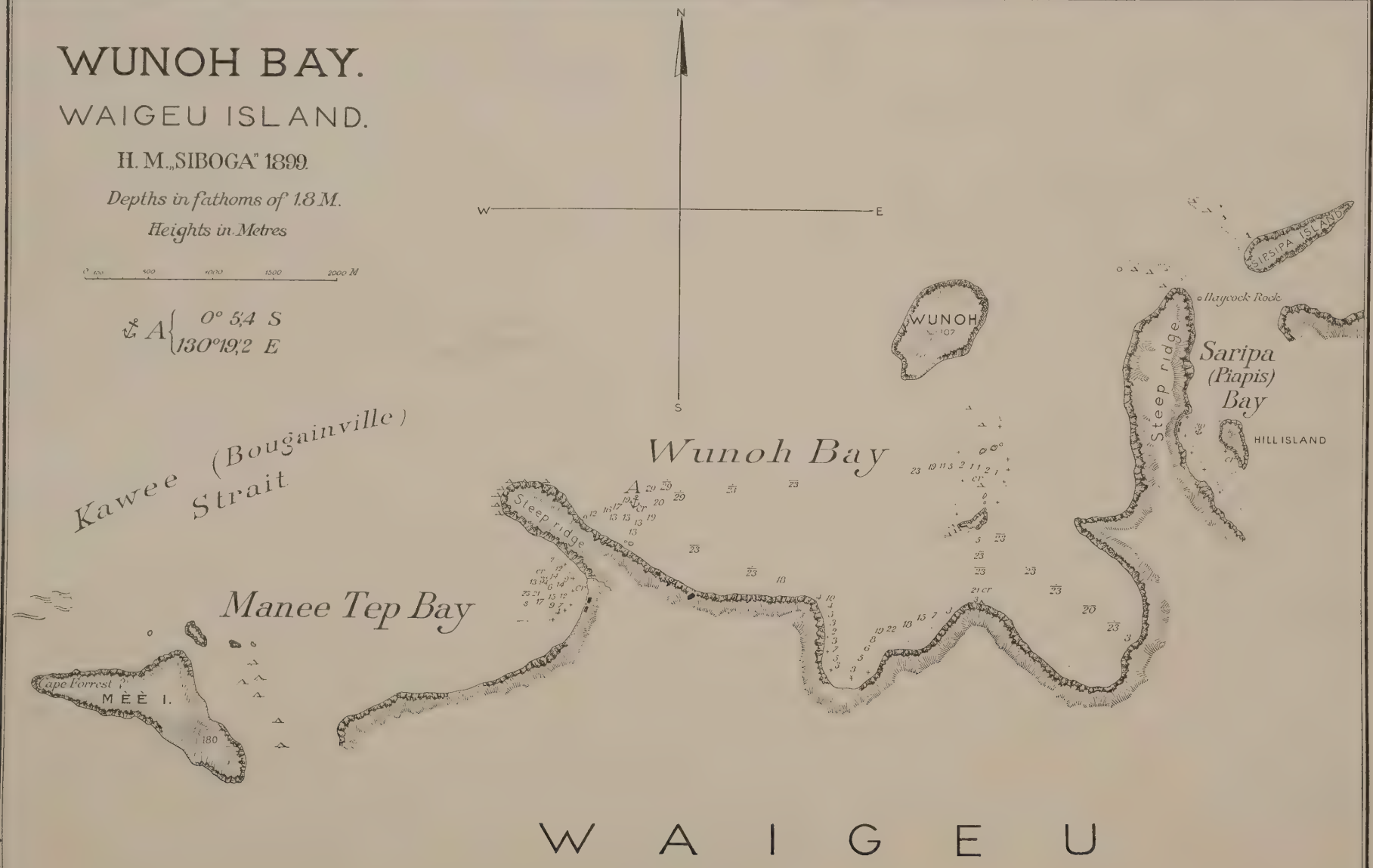
Gebé is highest in the Southern part; close to the South point is a round top, 340 M. high; not far to the Northwestward of it is a broad range only 20 M. less in height. To the Northeastward of Fau Gebé island is lower, then again higher, reaching 260 M. in height, gradually sloping down to the Northwest part, which is flat and low (40 M.)

Fau has a flat conical hill, 120 M. high, the colour of which is reddish. On the Southwest coast of Gebé no other dangers were seen than the rocky islets, marked on the chart.

53. **Position of islands East of Halmaheira.** 11. VIII. 1899. From astronomical observations and compass bearings it was concluded, that Pulu Muor together with Tabo Point are situated 3 miles Northnortheast, and the Northwest part of Gebé 2 miles Southsouthwest of the positions shown in the present charts. Joe island, which is low throughout, was found to be situated $1^1/_2$ miles more to the Eastward, and Gagi, which has many hills, some of them 350 M. high, 3 miles more to the Westward than they are shown on Dutch chart N° 145.

54. **Bank West of Bougainville Strait.** 12. VIII. 1899. West of the Southern entrance to Bougainville Strait a bank was found with depths of 7 fathoms, coral bottom, the West point of Balabalak bearing 338°, the East point of same 6°, the South point of Ruib 48°, and the extremities of Batang Pali 121° and 140°.

It is very probable that this shoal is a continuation of the bank of 5 fathoms, indicated on


WUNOH BAY.
WAIGEU ISLAND.
H. M. „SIBOGA" 1899.
Depths in fathoms of 1.8 M.
Heights in Metres
0 500 1000 1500 2000 M
⚓ A { 0° 5,4 S
130° 19,2 E
N
W
E
S
WUNOH
107
SIPSIPA ISLAND
Haycock Rock
Saripa
(Piapis)
Bay
Steep ridge
HILL ISLAND
Wunoh Bay
Kawee (Bougainville)
Strait
Steep ridge
Manee Tep Bay
Cape Forrest
MÈÈ I.
180
W A I G E U

the chart some miles more to the Southward, because from this position a bright discoloring of water was seen, bearing S.S.E. and extending $1^1/_2$ to 2 miles. On account of the bright color of this patch the depth on it was presumed to be even less than 5 fathoms. About 1 mile South of it the lead did not reach the bottom at 14 fathoms.

55. **Northwest Coast of Waigeu Island.** 12—15. VIII. 1899. Plate VII. (Stat. 152—155). The Northwest coast of Waigeu is generally steep and rocky with numerous islands and islets; it has many sharp indentations, forming deep bays and inlets. The figuration of this part of the coast being very incorrect on Dutch chart N^0 145, it is uncertain which point was baptized Cape Forrest by this traveller.

As far as concerns the entrance of the bay called Aljui Bay, the figuration on this chart is not too far from reality. When coursing at a distance of one mile outside this bay and the other one immediately South of it, which is more narrow, no doubt existed that both together form only one large bay, trending inward for at least 6 miles, and containing several large and high islands. The islet indicated on the chart in the midst of the entrance of Aljui Bay, is a steep, wooded rock of white stone, about 50 M. in diameter and 30 M. high.

Near the North point of Aljui Bay, close to the coast, is Mèè Island, 180 M. high, surrounded on its North and East sides by rocks and cliffs, some of them wooded. The West point of this island is a high, steep and sharp ridge, which, seen from the Southwestward, looks like the outer landpoint of Waigeu. Only when coming in the close vicinity of Mèè, it is found to be an island, for which reason its extremity may be presumed to be the Cape Forrest of the chart. East of Mèè Island the coast trends E.N.E., forming several small bays.

Manee Tep Bay. The first bay, of which Mèè forms the Western limit, is Manee Tep Bay, the East part of which was summarily examined. The entrance on this side is deep and clear of danger. Anchorage may be found in 20 to 25 fathoms, the Eastern extremity of the white beach bearing 67°, the North point of the bay 342° and its West point being in line with the South point of Mèè. On this same mark a small coral patch was found more to the Eastward at 0,1 mile from the bordering reef. At the East end of the sandy shore a creek discharges.

Wunoh Bay, separated from Manee Tep by a steep and narrow ridge, the extremity of which is 2 miles distant from Mèè Island, is 2.6 miles wide. The "Siboga" anchored near the West point of this bay in 18 fathoms, coral bottom, the North point of Wunoh Island bearing 52°, the South point of this island on with the East point of the bay 64°, the Southern extremity of the rocky islet within the bay 93°, and the West point of the bay on with Ruib Island 282°. Nearer to the shore the bottom is less steep and there is sufficient room for a ship to anchor in 16 fathoms. At a distance of 0,3 mile South of the Westpoint of the bay there is a small conical rock, close to the shore. Nearly midway in front of the bay is the rocky islet Wunoh, 107 M. high, Southward of which a series of stones and rocks trend towards a promontory, which divides the bay in two. The Eastern part was not examined; the Western part is deep everywhere, except on the anchorage, already mentioned, and also near the shore in the Southern part, where small craft might find anchorage.

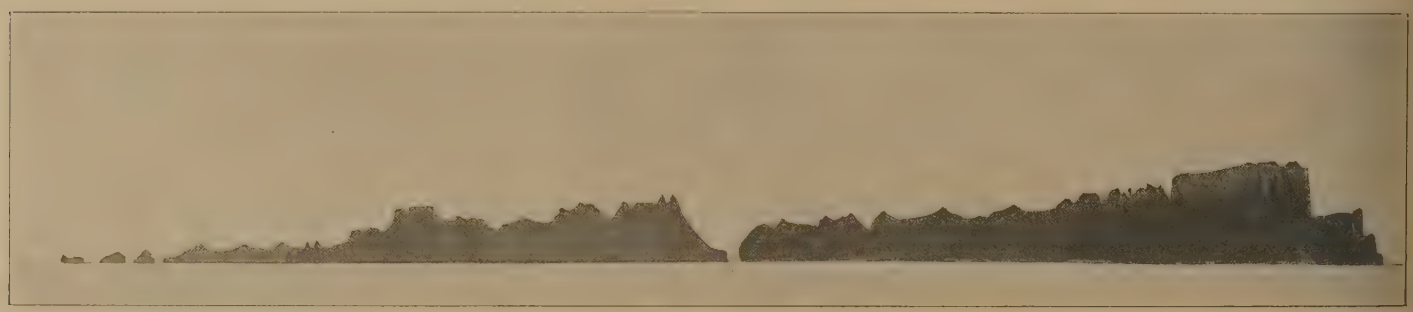
Piapis Bay. East of Wunoh Bay (Telok Wunoh) is Piapis Bay, as it is named on the charts, but which is called Telok Saripa (Saripa Bay) by the natives. The two bays are separated by another narrow and steep ridge, North of which rocks, which uncover, extend unto a distance of 0.1 mile from the shore.

The plan (18) of Piapis Bay on Dutch chart N^{0} 149, though not quite correct, is sufficient for use. The entrance of the bay between the rocks on the West side and those, which extend 0,3 mile W.N.W. off Sipsipa Island, measures about 450 M. and may easily be navigated at sight. A S.S.E.course on Haycock Rock, a small conical rock situated close to the Western shore of the bay, will clear the rocks off Sipsipa, whence a S.E. course is taken, which is gradually altered into South. The "Siboga" moored on two anchors in 30 fathoms, mud, between Hill Island and the shore, the Southpoint of this island bearing 131°, the Northpoint 77°, the Westpoint of Sipsipa 14°, the Eastpoint 34°, and Haycock in line with the Westernmost rock off Sipsipa 358°. There is little room here, although more than is shown on the plan, the figuration of the reefs not being correctly given. In the bight West of Hill Island is a sandy beach with a couple of huts.

Buffaloes Horn, 25 to 30 miles East of Piapis Bay, is a very conspicuous mountain, about 1100 M. in height. The steep, horn-like top, surpasses by far the surrounding range.

North Coast of Waigeu. Buffaloes Horn E.S.E., 26 miles distant.

Ruib Island is called Kawee by the natives, which name they also give to Bougainville Strait. Their name for Uranie, the Easternmost of the Ien Islands, is Mètjè; the Shaggy Rocks



Coquille. Uranie, W.N.W. 7 miles distant.

Ien Islands.

and Knoopen (Buttons) together are called Seprang by them. 8 Miles North of the Knoopen depths of 32 and 46 fathoms were found.

In Bougainville Strait no other dangers were seen than the rocky islets noted on the charts and the shoals, already mentioned.

The Southpoint of Aljui Bay bearing East, $1^1/_2$ miles distant, and again the same point bearing E.N.E., full 3 miles distant, soundings of 29 fathoms were obtained. In the Southern entrance to Bougainville Strait, at a distance of $3^1/_2$ miles from Dju Island, a depth of 15 fathoms was found, the West point of Mèè Island (Cape Forrest?) bearing 46°, the West point of Balabalak 338° and the North point of Dju Island 145°. At the same time a discoloring of water was seen in the direction of Dju, at a distance of about 800 to 1200 M. from the ship, this bank or reef stretching E. and W., and probably having less than 5 fathoms over it. The channel between this bank and the 5-fathoms-bank South of Balabalak, mentioned before, was estimated to measure only 5 miles but to be clear of dangers.

Batang Pali Island has many hills, the highest being 370 M. Dju Island is flat and low, being only 50 M. in height. The island South of Batang Pali is also low.

56. **Jef Fam Group.** 15. VIII. 1899. (Stat. 157). This group is composed of two separate groups of different nature, the 5 Northern islands being rocky and of moderate height, the others, also numbering about 5, being low and probably coral islands. The Northernmost and highest is very steep, especially on its Northeastern side, where no anchorage could be found close to the shore. The sharp peak of this island is 210 M. in height.

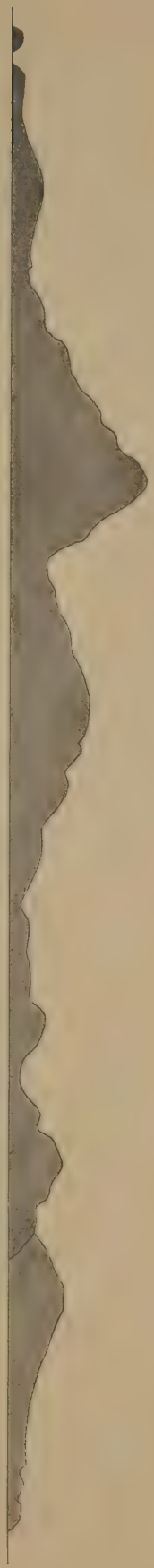
The Northwestpoint is composed of three low, rocky ridges, which evidently have their continuation under the water level, the only depth for anchoring being found there. Off this point at a distance of about 800 M. from the shore, the "Siboga" anchored in 19 fathoms, stony bottom, the apex of the island on with the Easternmost of the three ridges bearing 156°, the Western extremity of the island 191°, and the North point of the rocky islet East of Great Fam 121°, the altitude of the peak of Great Fam by sextant being 5° 50′. The depths are very irregular; the anchor being in 19 fathoms the lead on board showed 25 fathoms.

The position of this group is incorrectly given on the charts. The peak of Great Fam is in lat. 0° 34′ S. and long. 130° 15′.2 E.

The Southwesternmost island is 55 M. in height.

A depth of 28 fathoms was found, the Northpoint of Great Fam bearing E.N.E., 9 miles distant.

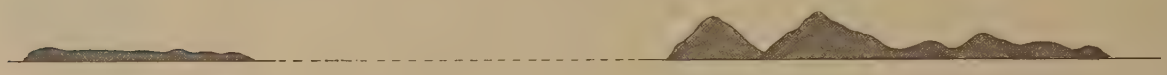
Batanta Island is mountainous; the highest top, bearing 140° from Great Fam, is about 1100 M. in height.



Jef Fam Besar, peak bearing about S.E.

57. **Jef Doif Group.** 16. VIII. 1899. This group, consisting of four small islands, is shown rather accurately on the charts. The Northernmost island is of moderate height, the others are low and have quite the appearance of coral islands. Inside the group depths of 15 to 20 fathoms were found. No indications of isolated dangers were seen, and according to a native sea-farer, acquainted with these seas, such dangers do not exist; only should a good berth be given to the reef bordering Schoteroog, which extends rather far from the Southeast side of this island. The native names and the heights of these islands are as follows:

Klaarbeek	Mios Pi	104 M.
Kommerrust . . .	Mios Gà	47 „
Schoteroog	Mios Pas	27 „
Vlaming	Mios Gien . . .	25 „



Kommerrust, bearing S.S.W., 13 miles distant. Klaarbeek, bearing about W.S.W., 13 miles distant.

Mios is the word for island in the Papuan language.

58. **Kofiau Island.** 16. VIII. 1899. (Stat. 160). This island is low for the greatest part. Nearly in the middle and not far from the North coast there are two hills, the Westernmost of which is 260 M., the other 180 M. in height. To the West of these hills the island is low, again further Westward it is hilly, being 60 to 100 M. in height.

Highest hill on the North coast of Kofiau Island bearing nearly South.

Close to the Northcoast, where the chart shows Deer Island, are a number of small islets. A good anchorage was found in 17 fathoms, coralbottom, North of the lower centre of the island, not far from the second islet, the Easternmost being the first, the Northpoint of the latter bearing 77°, the highest hill of Kofiau 106° and the Southpoint of the second

SEGET ANCHORAGE.

SELEE (GALEWO) STRAIT.

NEW-GUINEA, WEST COAST.

H. M. „SIBOGA", 1899.

Depths in fathoms of 1.8 Metre.

1° 25' S
130° 57' E.

0 150 300 450 900 M

islet (Deer?) 240°. Towards this islet the depth gradually decreases, so that a ship might go nearer until a depth of 13 fathoms. To seaward the depths increase rapidly.

The Northcoast of Kofiau is shown too much to the North on the charts, the position of the anchorage being in lat. 1° 9′.7 S. and long. 129° 47′.8 E., that of the highest hill in lat. 1° 10′.5 S. and long. 129° 50′.0 E.

59. **Seget Anchorage.** Selee (Galewo)-Strait. 18. VIII. 1899. Plate VIII. (Stat. 163). In the Western entrance of Selee Strait a good anchorage was found near Seget village in 16 fathoms, mud and stone, Gelo Island bearing 280°, Entrance (Membok) Island 266°, Selee Point 223° and Peli Island 50°, the distances from this island and from the shore both being 400 M. Peli Island is the Westernmost of the two islets off Seget village. Between this anchorage and the shore the depths are up to 22 fathoms.

The reef bordering the coast to the Eastward of Selee Point extends about 100 M. off shore; it is steep-to. West of Selee Point it extends further.

Most of the time the current was to the Southwestward with a maximum velocity up to $2^1/_2$ knots, that in opposite direction being weak and lasting only for a couple of hours. When strong the current caused the water to be reddish brown.

The position of this anchorage was determined to be in lat. 1° 25′.0 S. and long. 130° 57′.0 E.

60. **Salawatti and Misool Islands.** VIII. 1899. The seas surrounding these islands are only very superficially explored. Both these islands, together with the Westcoast of New Guinea, are situated upon a submarine plateau, the depths of which generally do not exceed 30 fathoms, increasing however to 50 fathoms and more to the Southward of the Pisangs. The Northern limit of this plateau trends from the Kabu Islands in a Westsouthwesterly direction, including the Nusela Islands, the Northernmost group of the numerous islands and reefs, which extend from the Northcoast of Misool to a distance of about 20 miles. A depth of 29 fathoms, which was found 10 miles to the Northeast of the Nusela Group, is very probably close within this limit. The islands to the West and South of Salawatti are all low and situated on a bank, composed of mud, sand and shells, the depths of which gradually decrease towards the coast of Salawatti. False Loslos bearing East, $1^1/_2$ miles distant, a depth of 9 fathoms was found. Southeastward from the Broken Islands and Tanjong Selee (English Point) bearing about East, 10 miles distant, the depth was 5 fathoms; from here towards Selee Point it gradually increases. On account of the tidal currents and the nature of the bottom the water in these surroundings is untransparent, and often of a reddish brown color.

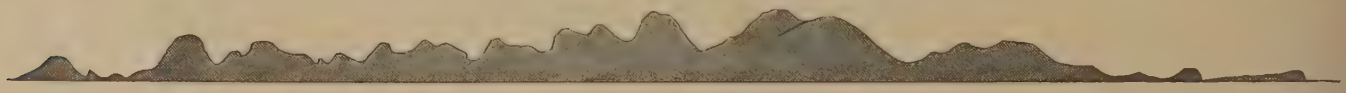
After leaving Seget anchorage the coast was followed at a distance of half a mile and Selee Point passed at the same distance, after which the course was gradually altered into S.S.W. On this course the depth first decreases till $5^1/_2$ fathoms at a distance of about 7 miles from that point, when it again increases, being 15 to 18 fathoms at a distance of 15 miles N. by E. from the Seven Islands, and 29 fathoms when 6 miles East of them.

According to the observations of the "Siboga" the Northernmost of the Nusela Islands have a position a few miles more to the Southwest than that shown on Dutch chart N^0 145.

A correction of about 6 miles to the Southwest should be given to the Schildpad Islands and to the two islands South of them, called Pulu Dua, which without doubt are those formerly reported by the "Vettor Pisani". The distance between False Loslos Island and the Schildpad Islands in consequence may amount to 12 miles, it however being unknown whether the proximity of the last named group is clear of dangers. A preliminary survey of the North coast of Misool by H. D. M. "Borneo" shows that the depths between the numerous islands and reefs off this coast are very variable and that the Northeast point of Misool should be drawn 6 miles more to the Eastward on the chart.

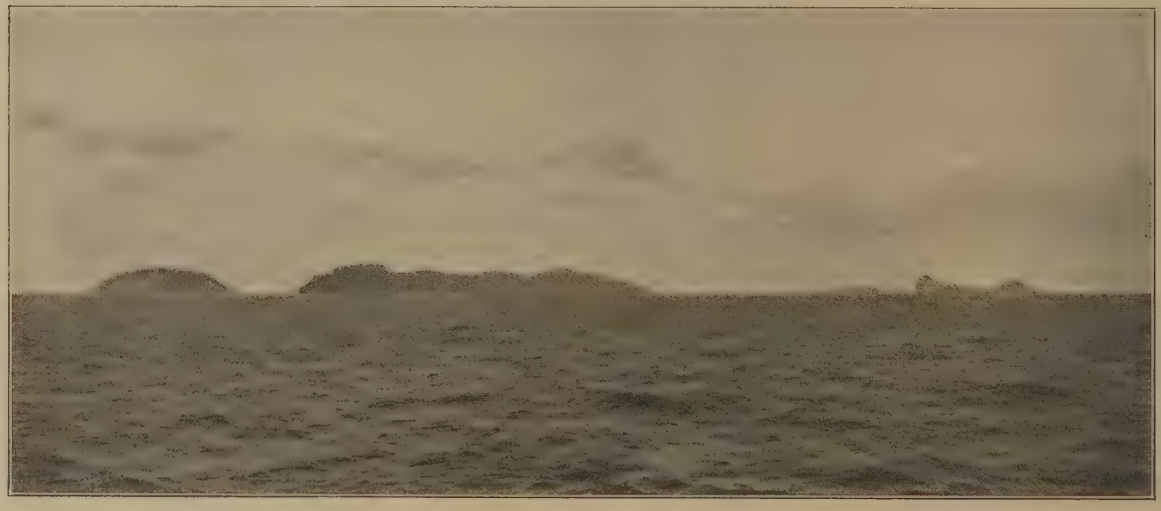
Off the East and South coasts of Misool there are numerous steep and rocky islands, many of them rather high. The Easternmost group, which lies isolated, is named False Pisangs. They are about ten miles to the Southeast of the Seven Islands, which consist of a number of steep, rocky islets, the highest of which is 65 M. in height. Another group, much higher, is situated to the Southwestward of the Seven Islands.

Seven Islands, centre of group bearing S.W. by W., about 6 miles distant.



Northern part of group (or Island) situated to the Westward of the Seven Islands, bearing W.S.W., about 22 miles distant, the Southern and lower part of this group then being in line with the Seven Islands [1]).

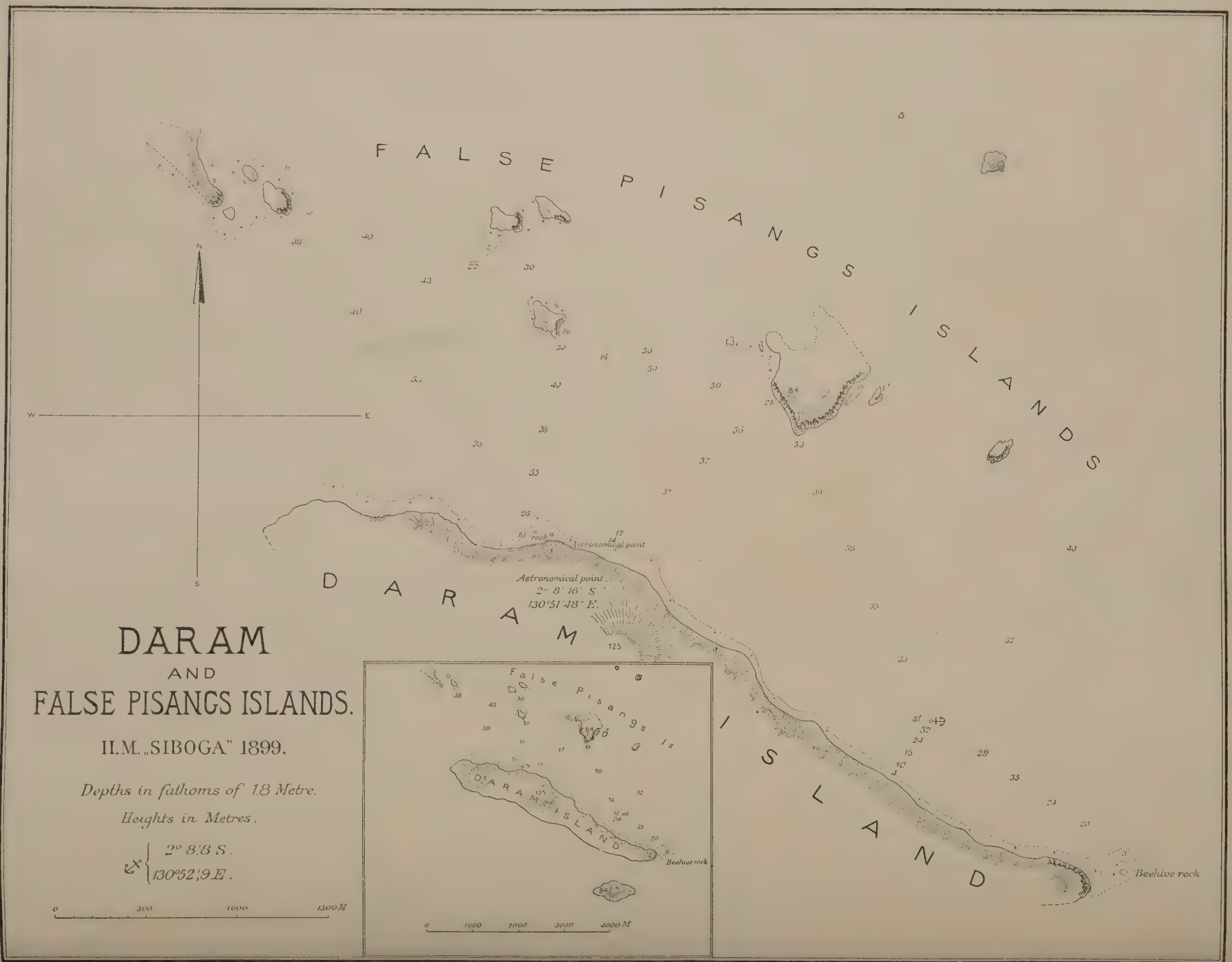
61. **Daram Island (False Pisangs)**, East Coast of Misool. 20. VIII. 1899. Plate IX. (Stat. 165). The "Siboga" anchored in 27 fathoms, stony bottom, the Northern extremity



Daram Group or False Pisangs, Daram bearing W.N.W.

of the island bearing 295°, the East point of the Easternmost rocky islet 17° and Beahive Rock near the Southeastpoint of Daram 130°. The distance from the bordering reef, which is

1) There is an error in the legenda of these two figures reproduced also in the first monograph of this publication.



DARAM
AND
FALSE PISANGS ISLANDS.

H.M. „SIBOGA" 1899.

Depths in fathoms of 1.8 Metre.

Heights in Metres.

Astronomical point
2° 8'.3 S.
130°52'.9 E.

narrow, was 0.2 miles. The depths gradually decrease towards the shore; close to the reef 10 fathoms were found.

This anchorage was approached by steering a Southern course on a point 0.5 mile distant from the Easternmost rock, situated North of Daram. This rock being passed a Southwestern course was taken on a little white beach, grown with low palmtrees, about the centre of the Northeast coast of the island. This coast trends a little inward.

The said rock bearing N.N.W., 0.5 mile distant, the lead showed 40 fathoms, nearer to the anchorage 32 fathoms. From the North coast of Daram a bordering reef extends to a distance of 100 to 150 M. off shore. The island is 125 M. in height.

North of Daram a series of steep rocky islets are situated in a Westnorthwesterly direction, at distances varying from 0.6 to 1,6 miles from the island. The highest of them is 84 M. in height. Between these rocks and Daram the depths vary from 35 to 40 fathoms and as far as the Northwest point of Daram no dangers were found. Some of the rocks are connected by reefs, between others are depths of 30 and 40 fathoms.

Close to the Southeast point of Daram and connected with it by a reef, is a rock having the shape of a bee-hive. It is surmounted by some trees, the tops of which are 18 M. above the sea-level.

Close to the South coast of Daram is another rocky islet, 84 M. in height, the South side of which shows a bare, brightly yellow patch, which is visible from a great distance. After leaving the anchorage on an Easterly course, which was soon altered into S.S.E., Bee-hive Rock was passed at a distance of $1^1/_2$ miles. The submarine sentry, set out at the anchorage and towed in a depth of 29 fathoms, did not touch the bottom.

62. **Lilintah,** South Coast of Misool. 30. VIII. 1899. (Stat. 176). Bound for Lilintah from the Southward, a N.W. course was steered on Pulu Billok, a small island, conspicuous by two peaks, 64 and 87 M. in height, the Westernmost being the highest. Having passed this island at a distance of about 600 M. from its Southwest side, a N.N.W.-course leads to the passage West of Matè Island, which is 108 M. in height and of some length in an Easterly direction. About 100 M. West of Matè is a small rock. The channel between this rock and the series of wooded rocks to the Westward measures several hundreds of Metres. "The Westernmost rock West of Wajil Island on with the East peak of Billok Island", bearing astern 156°, leads clear through this channel in the Southern entrance of which a depth of 29 fathoms was found. In the passage the lead did not reach the bottom with 13 fathoms. From here a N.W. course is steered until the highest summit of Matè bears 116°, which is then kept astern on an opposite course until the anchorage. The "Siboga" anchored in 20 fathoms, mud and gravel, the highest point of Matè Island bearing 116°, the landpoint of Lilintah 43°, the Westernmost of the flat rocky islets 19° and a low, yellow Bluff 355°.

The position of this anchorage was determined to be in lat. 2° 4′.3 S. and long 130° 14′.2 E.

Off Lilintah there is an extensive reef, uncovering at low water, on the Western part of which are four low wooded rocks. To the West of these rocks a moderate depth of water

is found until close to the shore, affording a good anchorage for small craft and boats. Between the flat rocks and the shore there is a boat-channel.

Close to the West of Lilintah the hills are 400 M., farther Westward, in about 130° 5′ of longitude, 540 M. in height.

When leaving Lilintah, after coursing S.W. for one mile, course S.W. by W. was taken on the Westernmost rock North of Waaf Island. Before reaching the rocky islets situated South of Efbee Island, course was altered more to the Westward. These islets, the largest of which is steep and dark colored, bearing North, Southwest Island (Jaan) was taken half a point on the port side; this island being 2 miles distant, the course was gradually altered into S.W. and S.S.W. Southwest Island has two hills, the Westernmost 56 M. in height.

Close West of it is a low rock.

63. **Sabuda Island,** New Guinea, West Coast. 22. VIII. 1899. (Stat. 168). This island has a length of $5^1/_2$ miles in an E.N.E. direction. It is hilly, the highest point being about the centre, 172 M. above the sea-level. Halfway between this summit and the West point of the island is an other hill, 148 M. in height. The Eastern part is lower and has a ragged outline. Off the West and Northeast points reefs extend; the latter is said to be the broadest. Not far from the North coast are two rocky islets, Sentjan and Tartaruga, resp. 46 and 52 M. in height.

At a distance of about $1^1/_2$ miles South of Sabuda there are four rocky islets grown with trees, the top of the highest being 88 M. above the sea-level. They are named the Pisangs. Approaching from the Westward Sentjan was passed on its Southside at a distance of 1000 M.; this islet bearing North the course was gradually altered into S.S.E. on the Westernmost of the conspicuous white beaches, situated between the projecting ridges on the North coast of Sabuda. The "Siboga" anchored in 35 fathoms, stone and sand, Sentjan bearing 318°, Tartaruga 28° and the extremities of Sabuda 68° and 240°.

The position of this anchorage was stated to be in lat. 2° 38′.4 S. and long. 131°34′.7 E., the distance to the nearst shore being 500 M.

In the course mentioned above a depth of 29 fathoms was found, the Northeast point of Sentjan bearing 314°, the North point of Tartaruga 78° and the extremities of Sabuda 90° and 197°. At a distance of 200 M. Southeast of this position a sounding of 20 fathoms was obtained. Another depth of 29 fathoms was found at 2 miles from the Northwest point of the island.

64. **Batu Putih Island,** New Guinea, West Coast. 23. VIII. 1899. This island trending East and West over a distance of $1^1/_2$ miles, has a steep and white appearance. It is 140 M. in height and was sighted at a distance of 26 miles. When at a distance of 600 M. from the steep Southwest point no bordering reef could be seen. The position of Batu Putih and of the coast South of the Mac Cluers Bay is shown about 6 miles too much to the Eastward on the charts.

The West point of Batu Putih was stated to be in: lat. 2° 57′.0 S. and long. 131° 57′.0 E.

Batu Putih Island, the West point bearing N.E.

65. **Atjatuning,** New Guinea, West Coast. 23. VIII. 1899. Plate X. (Stat. 169). Atjatuning (Ati Ati Onin) village is situated 8 miles West of Skru, North of the channel between Ekka and Pandjang islands.

The Easternmost house of the village with an iron roof half open of the landpoint of the cove, bearing 8°, will lead through said channel. From the East point of Ekka a reef extends to a distance of nearly 0.3 mile, and from the Northwest point of Pandjang an other to a distance of 0.2 mile. When inside the channel a N.N.E.course is gradually taken until the village and mosque are totally visible. The extremity of the reef, extending 0.6 mile from the South point of Atjatuning cove, is marked by a beacon; another smaller beacon is placed on the reef, which borders the shore on the East side of the cove. Anchorage was found in 32 fathoms, mud and stone, the first beacon bearing 293°, 300 M. distant, the mosque 321°, the West point of Pandjang 186° and the East point of Ekka 222°.

From here to Skru or Fak-Fak, the residence of the "Controleur", a course mid-channel between Pandjang and the shore is said to be safe.

Good fresh water may be obtained from a creek, discharging close to the East of the cove; boats however should avail themselves of the tide.

The South point of the cove is situated in lat. 2° 56′.6 S. and long. 132° 8′.1 E.

66. **Gisser,** Ceram, East Coast. 26. VIII. 1899. (Stat. 172). Gisser is an atol, to the West and East of which are navigable channels with depths up to 10 fathoms, marked by beacons. The "Siboga" anchored in the Eastern channel abreast the pier, in 10 fathoms, sand and coral, the extremity of the pier bearing 293°, the Southeast point of Gisser 221°, the extremities of Kilwaru 62° and 83°.

There is room enough to have one anchor with 40 fathoms of chain out, but mooring is advisable on account of the tidal currents. At spring tide the velocity of the current is $2^1/_2$ to 3 knots. When the wind is Southerly the ebb-tide, which runs to the Southward, causes a heavy sea.

Approaching from the Eastward, a W.S.W.course was taken on the centre of Kwamor,

which at a distance appears like an island, though it is connected with Ceram by a low neck. Having sighted the beacons the course was gradually altered till it was South on the centre of Gisser Island.

Gisser is a place much frequented by native traders; once a month a steamer of the "Koninklijke Paketvaart" calls here.

Fish may be obtained in abundance, other supplies more scantily unless ordered in time. Fresh water is scarce; in the dry season it is procured from Ceram Laut. On the summit of the last named island is a conspicuous tree, the top of which is 130 M. above the sea-level.

67. **East Coast of Ceram.** 28. VIII. 1899. From the observations by H. M. "Siboga", together with a preliminary survey by the Government Steamer "Arend" it results that the figuration of this coast from Keffing Strait to Tandjong Lama is not shown correctly on the charts. North of Kwamor (see sub. 66) the coast does not trend so much inward as is shown on Dutch chart N^0 146. The little island of Bazaket is situated about 5 miles more Southward, but the islet Akat, 33 M. in height, is shown in its proper position. Between both these islands the coast trends outward over a distance of several miles.

The point named Masiwan on the chart, is called Tandjong Tioli; this point and Ilor Point, situated $2^1/_2$ miles more to the Southward, are both low and lie $1^1/_2$ miles more to the Eastward than according to the chart.

Parang Island, which is flat and 125 M. in height, is situated 1 mile more to the Northeast. From Waru till near to Tandjong Timor the coast trends outward instead of inward. Timor Point has a position about 3 miles W.S.W. from that given on the chart.

Not far West of Timor Point is Bula Bay with good anchorage in 12 fathoms of depth. Then follows Ingelas Bay, where a ship may anchor in 7 to 9 fathoms.

Lama Point and Leeuwarden Reef are supposed to be a couple of miles to the West of the positions assigned to them until now; no data however could be obtained relative to this reef.

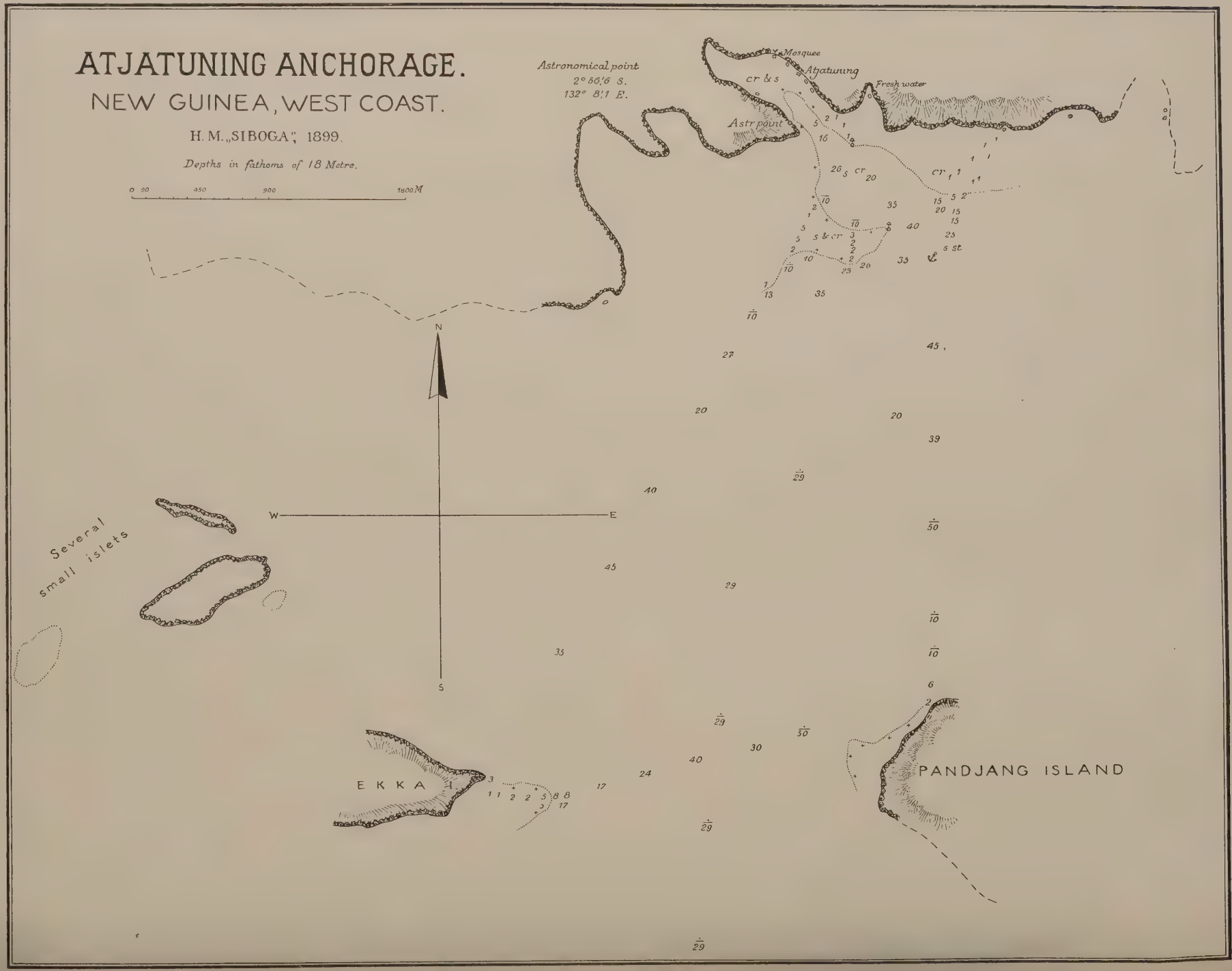
Madurang Island, 27 M. in height, is situated in lat. 3° 39′.0 S. and long. 131° 1′.8 E., which is $3^1/_2$ miles Southeast of the position noted on the chart.

The Government Steamer "Arend" anchored in many places off this coast and did not notice other dangers but those shown on the chart.

In the channel between Parang Island and Ceram the "Siboga" towed the submarine sentry in 29 fathoms without touching the bottom. From the East and from the Northwest points of Parang reefs extend a good distance off shore. During ebb-tide the water of the rivers of Ceram caused the water in this channel to discolor over a considerable distance, the color being light-green.

Several conspicuous mountains are seen on this coast. The Monnikskap (Monks cap), steep on its Northeast side, 790 M. in height; position: lat. 3° 46′.4 S. and long. 130° 44′.0 E. Westward of it is another summit, called Teri.

Mount Suru, steep on its East side, sloping on its West side, 750 M. in height, in about: lat. 3° 46′.2 S. and long. 130° 45′.5 E.


ATJATUNING ANCHORAGE.
NEW GUINEA, WEST COAST.
H. M. „SIBOGA", 1899.
Depths in fathoms of 18 Metre.
0 90 450 900 1800M
Astronomical point
2° 56'.6 S.
132° 8'.1 E.
Mosquee
Atjatuning
Fresh water
Astr point
cr & s
N
W
E
S
Several small islets
EKKA
PANDJANG ISLAND

Mount Selanggur, a huge, round summit, showing a knob on each side, when seen from the Southeastward. Its height amounts to 775 M. Position: lat. 3° 42′.2 S. and long. 130° 46′.6 E.

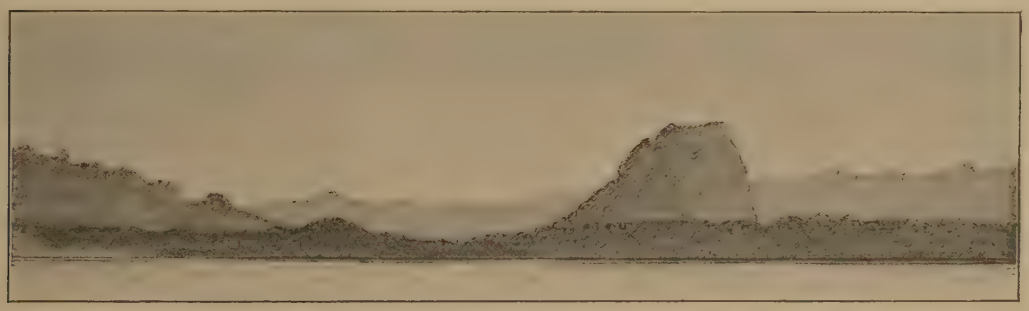
Mount Teri, N. 299° E. Monks Cap N. 303°.5 E. Mount Suru N. 308°.5 E. Mount Selanggur N. 321° E.

East Coast of Ceram, seen from Gisser anchorage.

Mount Bati, a flat range, sloping down towards the coast, about 500 M. in height. Position approximately: lat. 3° 36′.5 S. and long. 130° 49′.0 E.

To the Eastward of Mount Bati is another, lower range, called Kil Gà.

Near Tioli Point, a few miles from the coast, stands Kil Badir, a very conspicuous hill, the height of which was estimated to be 300 M. This hill bearing W.S.W. shows the



Kil Badír, bearing W.S.W.

North Coast of Ceram.

figure of a monks cap, the North side being steep and having some bare, white spots.

Position approximately: lat. 3° 38′.5 S. and long. 130° 43′.0 E.

68. **Waru Bay,** Ceram, North Coast. 28. VIII. 1899. (Stat. 174). This bay affords good anchorage in 10 fathoms, sand, the extremities of Parang Island bearing 47° and 64°, the extreme visible points of Ceram 90° and 346°, and the "Posthouders" Flagstaff 196°. The distance to the 5-fathoms-line is 250 M. Soundings gradually decrease towards the anchorage; $2^1/_2$ miles distant from the village the lead showed 29 fathoms.

Abreast the village there is no bordering reef, but a sandy shore, which uncovers until a distance of 200 M. to seaward at low water, leaving the pier quite dry. To the East and West of this shore there is a bordering reef along the coast; that to the Eastward extends

rather far from the shore; from the anchorage the edge of this reef was seen in line with the South point of Parang Island.

Waru has good hunting grounds; deer, wild pig and fowl.

69. **Kawa Bay,** Ceram, West Coast. 2. IX. 1899. (Stat. 179). Kawa village is situated in a bay, which is quite open to the Westward. Off the North point of the bay, not far from the coast, is the rocky islet Siri, called Sari on the chart. On approaching a S.S.W.-course was steered, leading 0.5 mile outside this rock, whence course was altered to S.E. by E. on the village, abreast of which the ship anchored in 25 fathoms, mud, sand and stone, Siri Islet bearing 346°, the North point of the bay 354°, the Northernmost house 121°, the extreme land point to the Westward 241°.

The bottom is rather steep, the 5-fathoms-line, which is close to the shore, being at a distance of 150 M.

The island Siri shown on the chart South of Kawa Bay is said by the natives not to exist, and in fact there was no other island to be discovered in that direction but Marsego Island, which is further from the coast and further to the Southward.

The creek South of Kawa forms a lagoon; in the rainy season fresh water may be procured from it by means of boats.

70. **Bonoa Island.** Ceram, West Coast. 4. IX. 1899. Near the Northeast point of Bonoa, at a distance of about 3 miles from the shore, strong ripplings were seen and close to each other soundings were obtained of 27, 29 and 40 fathoms, at the first sounding Talanuru Point bearing 71°, the land point South of Kawa 143° and the extremities of Bonoa 220° and 276°. Bonoa is hilly in the centre and in the Western part; the highest summit, a conspicuous small cone on the Southeast side of a range, is 600 M. in height. The Southwest part of the island slopes down towards the sea; the Northeast part is flat and only about 60 M. in height.

The narrow inlet, shown on the chart, was well visible from the Southwestward; its coasts are very steep, especially that on the Northern side. It could not be ascertained whether this inlet intersects the island totally from West to East or not.

71. **Kelang Island.** 4. IX. 1899. (Stat. 180). On the Northwest side of this island anchorage was found in 27 fathoms, coral bottom, the extremity of Bonoa bearing 40°, those of Kelang 52° and 236°, the entrance of a creek 149°, a somewhat conspicuous bare hill not far from the coast 185° and the Northwest point of Manipa Island 248°, the distance from the shore being 500 M. and that from the 5-fathoms-line 375 M. The bottom is rather steep-to. This anchorage is abreast a sandy beach in a place where the coast is low and trends somewhat inward, to the West of a rather steep, grown ridge, which terminates on the coast. Some hundreds of Metres to the North and South of the creek other creeks discharge. The island is mountainous and densely wooded; the highest summit, a conspious knob near the Northeast point of the island, is 845 M. in height.

A mile to the Southeastward of the Southwest point of the island, from which a reef extends, which uncovers, there is a village near the shore.

Passing through Kelang Strait in September a strong Northwesterly current was observed, causing strong eddies, especially off the Southeast point of Manipa, from which a reef extends.

72. **Manipa Island.** 11. IX. 1899. (Stat. 184). On the South coast of this island good anchorage was found South of Kelang village, in 20 fathoms, coral sand, the Southwest point of Manipa bearing 298°, the other extremity, being two landpoints nearly in line, 94°, and the extremities of Tuban Island 54° and 79°.

The bottom is level; 200 M. North of the anchorage the lead showed 19 fathoms.

When leaving this anchorage on a Western course, a depth of 18 fathoms was found 200 M. to the East of a spot situated on the following bearings: West point of Soangi 311°, the Northwest point of Tuban 68° and the South point of Manipa 92°. Close West of this position a sounding of 40 fathoms was obtained. The strong eddies observed in this locality lead to the supposition, that probably depths of less than 18 fathoms might be found there.

Manipa Island is 516 M. in height, Soangi or Sawangi, the rocky islet near its Westpoint 90 M.

73. **Sanana Bay,** Sula Besi Islands. 13. IX. 1899. (Stat. 193). Sanana village, the residence of the "Posthouder" of the Sula Besi Group, is situated in a small and nearly circular cove, which affords very good anchorage in 10 to 12 fathoms of depth, muddy bottom, for vessels of moderate size, especially in the West-monsoon. The entrance between the reefs, which border the bay on its North and South sides, only measures about 120 M. The extremities of these reefs are marked by beacons; in case these have disappeared the Posthouder orders native boats with small flags to be put instead, whenever a ship shows the intention of entering the bay. The following are good leading marks to pass the entrance, either: "A low part in the range of hills not far behind Sanana, kept between the house of the Posthouder and the old fort, bearing 281°", or "the old fort bearing 290°". The house of the Posthouder, in front of which is a flagstaff, is situated twice its own breadth to the right of the Great Mosque.

The tidal currents running in the direction of the coast outside the bay, due allowance should be given to them when entering, which should be done at a good speed on account of the counter current, which may be experienced close inside the entrance. The edges of the reefs are rather steep. The plan of this bay on Dutch chart N° 149 is sufficiently correct.

Cattle, fish, fowl and fruit may be procured here. The flagstaff is in lat. 2° 3′,0 S., long. 125° 58′.4 E., the latitude being taken from the chart.

Sula Besi is hilly throughout; the Southern part being highest, 565 M. Near the North point is a round summit, 500 M. in height.

From the observations it was concluded that the East coast of Sula Besi is somewhat more to the Westward, and the South coast of Mangguli Island somewhat more to the Northward than they are shown on the chart.

Mangguli is mountainous; Northeastward from the North point of Sula Besi it is about 1000 M. in height. Lisamatula Island, which is 245 M. in height, is smaller than it is shown on the chart; the East point is nearly two miles more to the Westward.

74. **Bara Bay.** Buru Island, North Coast. 16. IX. 1899. (Stat. 200). The "Siboga" anchored in the Southeastern part of the bay in 27 fathoms, mud and stone, the extremities of the bay bearing 353° and 298°, the nearest creek entrance 94°, another creek 207°. In this last creek fresh water was obtained, the boats availing themselves of the tide. Bara village, situated a few miles North of this anchorage, is very poor.

Bara Bay, being surrounded by high and steep mountains, is very picturesque; it is open for winds from West to North. The plan on Dutch chart N° 147 is sufficiently correct.

75. **Buton Strait.** 20—21. IX. 1899. (Stat. 204—207). This strait may be navigated midchannel nearly everywhere at sight, the depth being moderate and up to 86 fathoms in the wider Southern part.

There are two narrow passages; the Southernmost, in which a strong current was experienced, has no dangers; the depth midchannel is 15 fathoms.

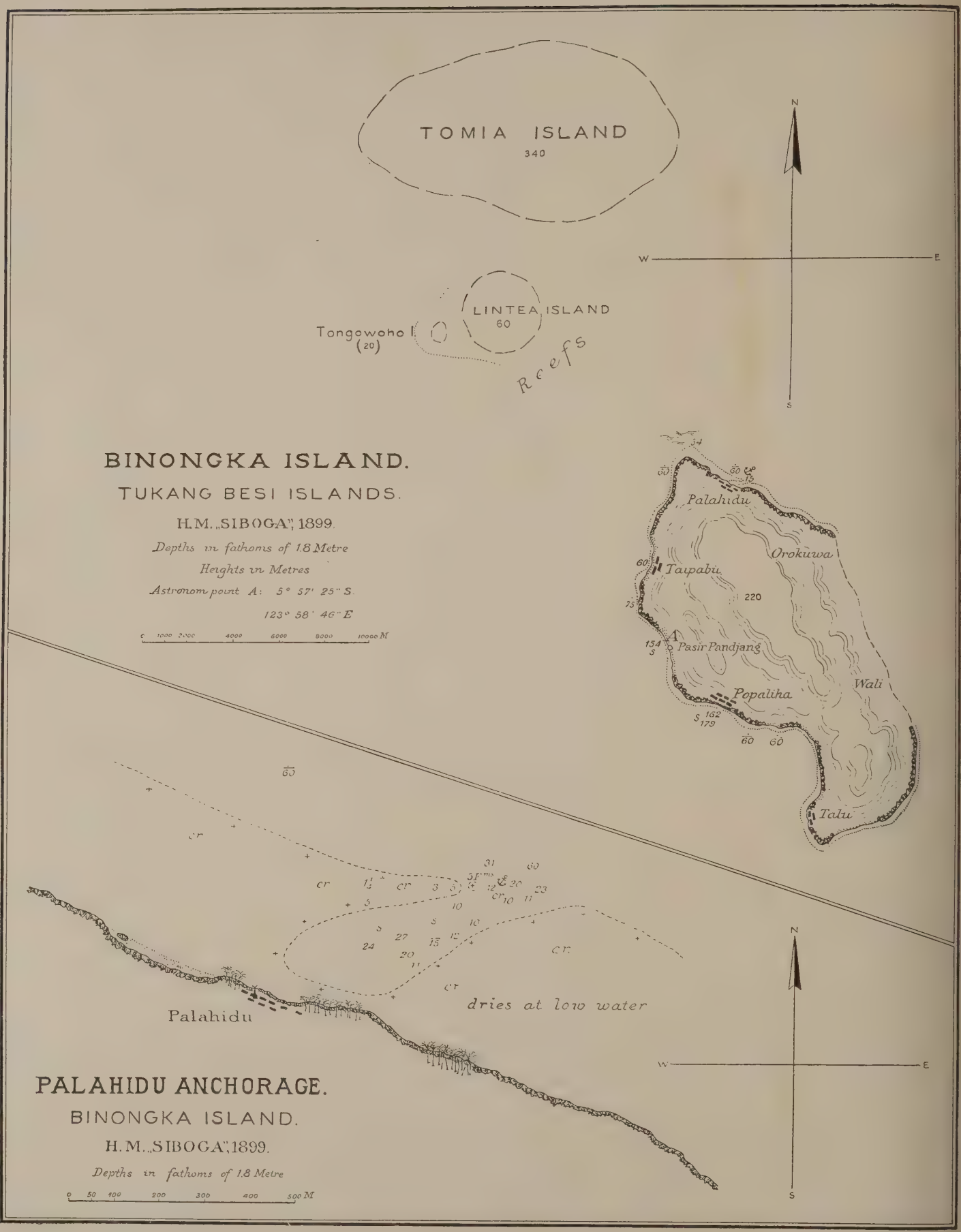
The Northern passage, South of Haai Point, is between some reefs on the West side and three small islands, Puning, Lebantan and Koholipana on the East side. "Lambolo Peak open to the left of Koholipana" bearing 178° is a good leading mark to clear Karang Banka, the Easternmost of the reefs. This mark is taken when Labunea Point bears East, and kept until the South point of Lebantan bears East, whence gradually the course is altered more to the Westward, keeping midchannel between Koholipana and Leiboroa Point.

Near Lohio (Lohia) the "Siboga" anchored in 12 fathoms, mud; at Buton in 14 fathoms, mud, the coal stores bearing about S.S.E. [1]).

76. **Kabaëna Island.** 23. IX. 1899. (Stat. 209). There is good anchorage off the South point of this island in 12 fathoms, coralsand, the South point of Telaga Besar Island bearing 109°, the extreme point of Kabaëna 66°, the right side of its Southpoint 7°. The view given on the plan of H. D. M. "Sindoro" from the year 1864, as well as this plan itself proved to be correct, so that this anchorage was easily approached at night with moonlight. The submarine sentry, towed in 29 fathoms, touched the bottom in the same instant when the lead on board showed 13 fathoms, the ship just then passing a streamrippling. Another distinct rippling at a distance of 600 M., supposed and afterward ascertained to

Kabaëna Island bearing N.W., about 17 miles distant.

1) A complete survey of Buton Strait has since been made by the Dutch surveying vessel "Bali", the results of which were published by the Dutch Hydrographic Office in Chart N° 110 and in the "Mededeelingen op Zeevaartkundig gebied over Nederlandsch Oost-Indië", N° 27.


TOMIA ISLAND
340
N
W
E
S
LINTEA ISLAND
60
Tongowoho I.
(20)
Reefs
BINONGKA ISLAND.
TUKANG BESI ISLANDS.
H.M. „SIBOGA", 1899.
Depths in fathoms of 1.8 Metre
Heights in Metres
Astronom. point A: 5° 57' 25" S.
123° 58' 46" E
0 1000 2000 4000 6000 8000 10000 M
Palahidu
Orokuwa
Taupabu
220
Pasir Pandjang
Popaliha
Wali
Talu
cr
dries at low water
Palahidu
PALAHIDU ANCHORAGE.
BINONGKA ISLAND.
H.M. „SIBOGA", 1899.
Depths in fathoms of 1.8 Metre
0 50 100 200 300 400 500 M

be that of the edge of the reef could be clearly seen in the moonlight. The bordering reef uncovers throughout at low water; at high water it is well marked by discoloring. The height of Kabaëna Peak is 1756 M.

77. **Kabia (Baars)-Island.** 29. X. 1899. (Stat. 215). This island is only 38 M. in height. It is wholly surrounded by a coral reef, which is very steep-to, and in which there are two ponds with moderate depths. Another reef lies isolated close to the East of Kabia. There is no anchorage, the depths close to the reefs being 50 fathoms and more.

At a distance of 900 M. to the West of the Northwest point of the reef the lead showed 278 fathoms, rock, 300 M. distant from the Southside of the reef 102 and 116 fathoms.

78. **Binongka Island,** Tukang Besi Group. 1. XI. 1899. Plate XI. (Stat. 220). This island is 10 miles in length N.N.W. and S.S.E., and 4 miles in breadth. It consists throughout of elevated coral terraces, and is 220 M. in height in the Northern part. When at a distance there are no conspicuous hills to be distinguished; when nearer to the island a number of rocky lumps may be seen. It is surrounded by a bordering reef extending from 60 to 250 M. off shore, this reef being generally largest off the landpoints. It is steep-to everywhere, so that there are no anchorages, with the exception of that near Palahidu on the North coast and, as the natives told us, another one near Orokuwa on the East coast. Also near Taipabu on the West coast the bottom is somewhat less steep, 45 fathoms, sand, being sounded there at a distance of 100 M. from the reef. In the East monsoon, when the wind is always blowing from the shore, a ship might temporarily anchor here.

Besides many separate dwellings, scattered all over the island, there are at least six villages, viz. Talu, Popaliha and Taipabu on the West coast, Palahidu on the North coast and, according to informations, Wali (Bale?) and Orokuwa on the East coast.

The shores are composed of cliffs of dead coral, with casual patches of coral sand, the largest of which on the West coast, is Pasir Pandjang, between Popaliha and Taipabu. At about 5 miles to the Northwest of Binongka is Lintea Island, rather low, only a few miles in diameter and densely wooded. Its Southwest point is connected by a reef with the islet Tongowoho. To the Northeast of Lintea is Tomia Island, 340 M. in height, apparently some 5 or 6 miles in diameter and separated from Lintea by a channel of 1 to 2 miles in breadth. The position of Tomia, which is said to be inhabited, is incorrectly given on the chart, on which Lintea and Tongowoho do not figure at all.

Palahidu Anchorage. Plate XI. This anchorage is well available for vessels of moderate size. The reef abreast Palahidu village has a sufficiently broad and deep inlet, trending in a Westsouthwesterly direction from the verge of the reef towards the village. When the sight is good this inlet is clearly visible. The entrance, which is at least 100 M. in breadth, has depths of 10 fathoms, coral bottom; further inward, where the breadth is about 200 M., the soundings are up to 27 fathoms, sand bottom. On the West side of this inlet the bordering reef forms a tongue, trending East- and Westward, with depths of 5 fathoms, gradually decreasing

to the Westward. Close Eastward of this tongue is an isolated lump of coral with somewhat less than 5 fathoms over it. The edge of the reef on the Eastside of the inlet is steep-to; outside the entrance the depth increases rather rapidly to 20 fathoms and then more rapidly still to 60 fathoms and more. For a short stay a ship may anchor outside the entrance in 20 fathoms having another anchor on the bar in 10 fathoms. For a longer stay it would be better to moor the ship in the inlet.

Koka Reef was observed to have a position about 3 miles to the Eastward of that shown on the chart, the centre being in about: lat. 6° 4′ S. and long. 124° 23′ E.

The position of Moro Maho (Veldhoen Island), which was sighted at 16 miles, is given rather correctly on the chart.

79. **Lucipara Islands,** Banda Sea. 8. XI. 1899. Plate XII. (Stat. 225). This group consists of four coral islands, situated together on one extensive reef, which uncovers nearly everywhere at low water. This reef measures about 5 miles N.W. and S.E. At a distance of 6 miles to the Southwest of this group there is another reef, which also uncovers. It measures 3 miles W.N.W. and E.S.E. and has two sandy patches, which never cover. The channel between the reefs is very deep and clear of dangers; midchannel the lead showed 582 fathoms.

The edges of the reefs are steep-to everywhere, so that no anchorage is to be had. The remains of the S.S. "Willem I", wrecked on the Southwestern reef in 1837, are still visible.

When at anchor to the South of this group, by means of the dredge-rope attached to a wharp, on a depth of 311 fathoms, we experienced very irregular currents and strong whirlpools.

The Northwesternmost island, on which occasionally fishermen abide, and which is 33 M. in height to the tops of the trees, is the largest and highest of the group.

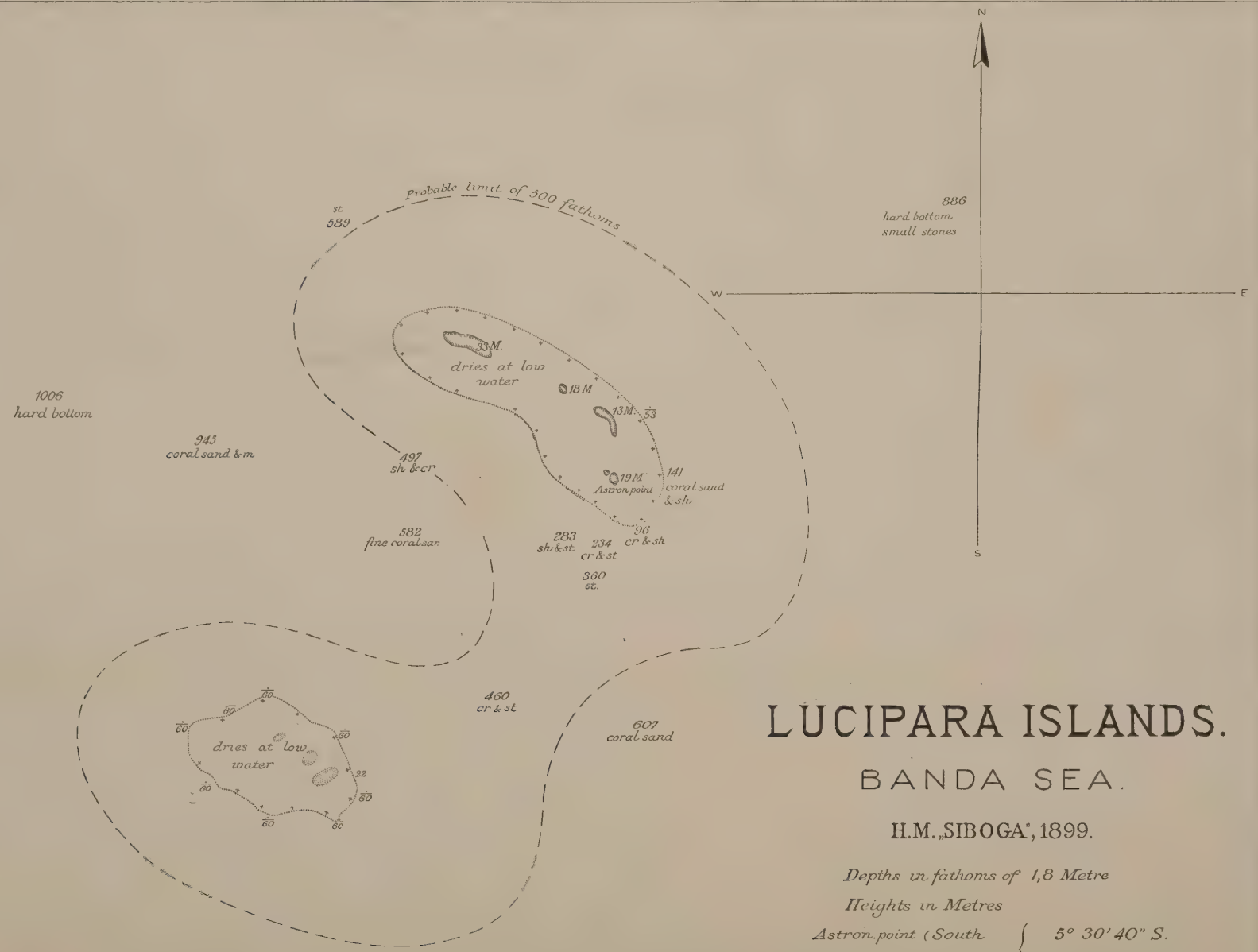
The position of the South point of the Southernmost island was stated to be in lat. 5° 30′40″ S. and long. 127° 33′22″ E.

The **Schildpad Islands,** which are also low, were sighted at a distance of 16 miles.

Nearly midchannel between the Lucipara and Schildpad Groups the lead showed a depth of 886 fathoms.

80. **Ambon (Amboina) Island.** 5. IX. and 14. XI. 1899. (Stat. 181 and 231). The South coast of Ambon is steep-to everywhere, and may be safely approached within a short distance. On account of this and of the high hills it is nearly always possible, except in thick rainy weather, to enter Ambon Bay and to proceed as far as Ambon anchorage even at night, the shores of the bay being also clear everywhere within a very short distance. In the outer bay anchoring is only posible in some places near to the shore; in the Inner Bay a ship may anchor anywhere. Abreast the town the best anchorage is in 25 fathoms, the pier near the fort bearing about East. On this pier a red light is shown.

To the Northward of this anchorage there is a red buoy for the Government steamers, to the Southward an other one for the steamers of the "Koninklijke Paketvaart", which always lie alongside their own jetty. The bottom on the anchorage being steep, it is advisable to veer



LUCIPARA ISLANDS.

BANDA SEA.

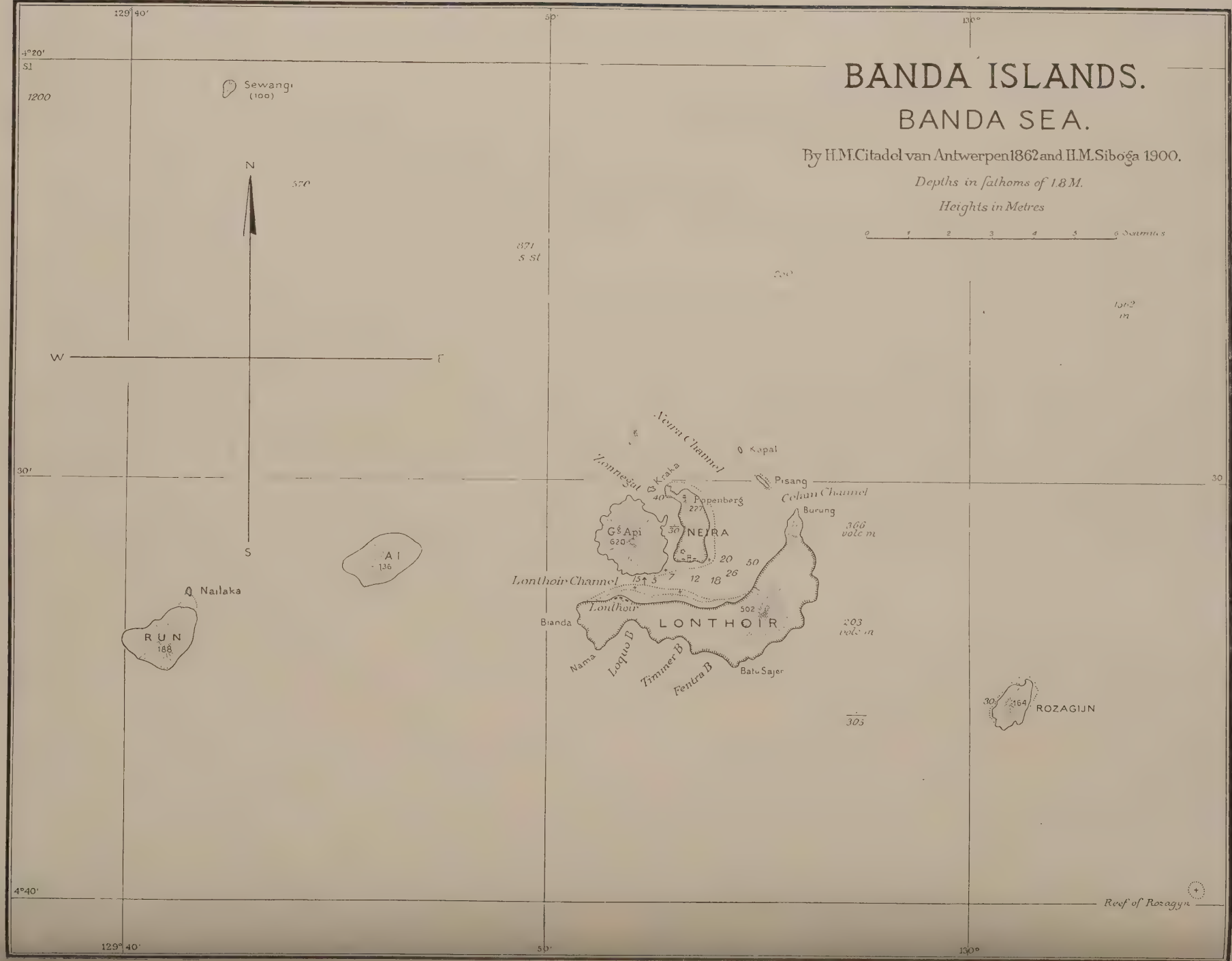
H.M. „SIBOGA", 1899.

Depths in fathoms of 1,8 Metre

Heights in Metres

Astron. point (South point of Southern island) { *5° 30' 40" S.* / *127° 33' 22" E.* }

— — — *Probable limit of 500 fathoms.*


BANDA ISLANDS.
BANDA SEA.
By H.M. Citadel van Antwerpen 1862 and H.M. Siboga 1900.
Depths in fathoms of 1.8 M.
Heights in Metres
0 1 2 3 4 5 6 Sea miles
129° 40'
50'
130°
4°20'
4°40'
Sewangi (100)
1200
N
S
W
E
570
871
S St
1562 m
Nailaka
RUN 188
AI 136
Nera Channel
Kapal
Ronnegat
Kraka
Pisang
Celam Channel
Burung
366 volc m
Popenberg
277
Gs Api 620
NEIRA
Lonthoir Channel
Lonthoir
502
Banda
LONTHOIR
203 volc m
Nama
Loqui B
Timmer B
Fentra B
Batu Sajer
305
ROZAGIJN
164
Reef of Rozagyn

down the anchor with 25 or 30 fathoms of chain and then proceed to the anchorage until the anchor catches.

$1^1/_2$ Miles to the Southwestward of the town pier are the Government coal stores. The coaling pier projects only as far as the edge of the reef, which trends outward East of it. For this reason a ship should moor with her bow to the pier, having her port bow-anchor in 10 fathoms and a stream anchor aft in 20 to 23 fathoms to keep well free from the pier, which is not strongly built. Coals were shipped at a rate of 125 tons a day.

Midchannel in the entrance of Ambon Bay the "Siboga" sounded 352 fathoms; 4 miles more inward the Government Steamer "Arend" obtained a sounding of 250 fathoms.

81. **Nalahia Bay,** Nusa Laut Island. 19. XI. 1899. (Stat. 234). This bay is a rather deep inlet, situated in a point where a ravine intersects the coast. The "Siboga" anchored in 25 fathoms, mud and sand, Wakukeke Point bearing 59°, an open shed 236°, Namula Point 292° and Tala Point 304°. This anchorage affords good shelter in all seasons, there hardly ever being sea in the bay. The plan on Dutch chart N° 148 is sufficiently correct; the white pillar however was not to be seen. The figuration of the coastline of Nusa Laut on Dutch chart N° 146 is incorrect.

Tala Point may be known by some isolated slender trees, higher than the surrounding ones; Wakukeke Point by its outer border being grown with low mangrove trees. Off both these points the bordering reefs project about 300 M.; off Amet Point East of Wakukeke Point it extends about 500 M.

Nusa Laut is hilly and well cultivated; it is 358 M. in height. It has seven villages with a total number of 4000 inhabitants, all christians. Hot springs are found in the vicinity of Nalahia, within ten minutes distance. Good fresh water may be procured close to the landing place and is shipped by means of barrels. Some provisions may be obtained here.

82. **Banda Islands.** 22. XI. 1899. Plate XIII. (Stat. 240). The channel between Gunong Api (Banda Peak) and Banda Lontoir is rendered rather narrow by the reef, which projects from the Lontoir shore. This reef is marked by a beacon, West of which the steep shore of Gunong Api should be closely followed. After having passed Verbrande Hoek, when entering, this point should be kept astern bearing W. by N., until the entrance to Zonnegat bears North, whence an Eastern course is taken towards the anchorage.

Near the point Eastward of Verbrande Hoek a beacon stands close to the shore on a rock, which uncovers. There is good anchorage in 7 to 8 fathoms, sand and coral, the Residents pier bearing North.

When proceeding Eastward from this anchorage an Eastsoutheastern course should first be taken until midchannel, as the bordering reef off the Southeast point of Banda Neira seems to extend further than is shown on the plan. The channel between Banda Lontoir and Pulu Pisang is wide and clear of dangers. Pisang is grown with coco trees.

Gunong Api, an active volcano, is 620 M. in height, Banda Lontoir (Great Banda) 502 M., the hill on Banda Neira, called Papenberg, 227 M.

The idea expressed by some of the inhabitants of Banda, that a submarine ridge with moderate depths should exist, which connects Banda with the Southeast part of Ceram, was found to be absolutely erroneous. At distances of 10 and 25 miles to the Northeast of Great Banda the lead showed 1662 and 2753 fathoms respectively.

The great depth of 4000 fathoms figuring on the charts, 22 miles to the West of Pulu Sewangi, does not exist; almost exactly on the same spot the depth was stated to be 2460 fathoms (4428 M.).

83. **Tiur Island.** 4. XII. 1899. (Stat. 248). According to the observations by the "Siboga" and the Government Steamer "Arend" the plan of this group (the Watubela Islands) is not correct [1]).

Kasiwui Island, is 355 M. in height, near its South point. Tiur has two summits, the Southernmost being highest, 390 M. It has four villages with a total population of 400 inhabitants, part of which is always navigating.

The "Siboga" anchored near the North point of Tiur in 24 fathoms, sand, the extreme points of the island bearing 133° and 210° and Rumah Lusi village 182°, the distance from the shore being 500 M., that from the edge of the reef (4-fathoms-limit) 175 M. A current of $2^1/_2$ knots per hour was experienced here. Between Tiur and Baam Island no dangers were seen. There are no volcanoes on Kasiwui and Tiur, as was formerly supposed. Stars altitudes showed the Northpoint of Tiur to be situated in lat. 4° 41′.8 S. and long. 131° 43′.1 E.

84. **Kur Islands.** 6. XII. 1899. (Stat. 250). The position of most of the islands of this group was stated to be somewhat more to the North and to the West than that shown by the chart.

Kur, the largest of the group, is 400 M. in height; it has several villages. Abreast Kilsuin village the "Siboga" anchored in 15 fathoms, coral bottom, at a distance of 200 M. from the 4-fathoms-limit, the extremities of Kur bearing 32° and 177°, the flagstaff of Workaar 53°, that of Kilsuin 101°, and the mosque of Ramoon 163°. At this anchorage the landpoint North of Workaar is seen exactly inside the extreme point of the island.

The bordering reef, which extends 500 M. off shore, has an inlet abreast Kilsuin, which affords a good harbour for small craft and boats but is not large enough for vessels.

Fishing is carried on here by means of dams, constructed on the reef in the same manner as at Savu Island. The position of the inlet was stated to be in lat. 5° 20′.9 S. and long. 131° 57′.0 E., the observation spot being on the shore in the axis of the inlet.

The names "Nusa Tello Islands", for the Kur Group and "Tionfolokker Islands" for the Tajandu Group, which names figured on former charts and are also mentioned in Pilots (Gregory, Findlay) are not known at present.

Some of the names of islands in this neighbourhood were pronounced in a somewhat other way by the natives than it should be expected from their spelling used on the chart,

1) This plan has been corrected since.

viz.: Pulu Boen was said to be Pulu Boei, Kaidos — Kainos, Kaimeer — Kammeer. Instead of Fador they pronounced: Fadol and Fadòh, instead of Winin — Wonin, these two names being those of the islands Dol and Onelin mentioned by Findlay.

In the same way they pronounced Workaar instead of Werkaar and Kilsuin instead of Kilsui, in their language the stress being given to the second syllable of these words, which is at the same time pronounced in a prolonged way.

Kei Islands. 8—20. XII. 1899.

85. **Taam Island.** Tajandu Group. 8. XII. 1899. (Stat. 252). The "Siboga" anchored abreast Taam village in 18 fathoms, coral bottom, the extremities of the island bearing 48° and 154° and the mosque of Taam 69°, the distance from the shore being 700 M., that from the 3-fathoms-limit 150 M. The bottom being steep it is recommended to veer down the anchor with 20 fathoms of chain beforehand.

The height of Taam Island was stated to be 140 M., which is less than the height given on the chart.

Midchannel between the Tajandu Group and Nuhu-Roa the lead showed 172 fathoms.

86 **Er Island.** 11. XII. 1899. (Stat. 255). The "Siboga" anchored on the North side of the reef off Er Island, in 12 fathoms, coral bottom, the Northwest point of Baëeh bearing 58°, the Northeast point of Godan 136°, Ngidiun Hill 144° and the West point of Er 185°. This anchorage was approached by keeping the summit of Ngidiun Hill on with the apex of Godan Island.

87. **Tual Anchorage.** 12. XII. 1899. (Stat. 258). The channel South of Du-Roa (Dulah Laut) was wholly navigated at sight at low water, the reefs being well visible then. The South side of the isolated, narrow reef which borders the channel on its Northern side, was marked by a beacon, useful probably at high water.

The channel leading to Tual is navigated by keeping Tual mosque just open of Dumar Point, until near to the reef with beacon North of this point, whence a course is taken on Tual Point parallel to the shore, at a distance of about 300 M. from it, the passage between Dumar Point and the reef West of it being navigated at sight. This reef is also marked by a beacon. The "Siboga" anchored in 10 fathoms, sand, 125 M. distant from the reef, the jetty bearing 148°, the rocky point West of Tual 179° and the North point of Fair Island 296°.

Some provisions can be obtained here. Fresh water is procured by the steam-sawing factory "Toeal", at the rate of *f* 1.50 per 600 L., if for the boilers, and *f* 2.— for the same quantity, if for drinkwater.

88. **Elat,** Great Kei. 16. XII. 1899. (Stat. 261). The "Siboga" anchored in 15 fathoms, mud, the South point of Sfat (Ifat) Island bearing 59°, the landpoint near Elat 139° and the Northwest point of the bay 295°.

The summit of Gunong Warhuk open to the right of the South point of Ifat is a good

leading mark for approaching, until East of the $3^1/_2$-fathoms-shoal, whence a Southerly course is taken until the North point of Kei Dulah is in line with the South point of Nuha Jaan. The isolated reefs and also the extremity of the reef extending from Ifat are marked by beacons.

To clear the North point of Nuhu Jaan keep the summit of Gunung Vakoi open to the left of Nuhu Ru.

89. **Feer Anchorage,** Great Kei. 18. XII. 1899. (Stat. 263). The anchor was dropped here in 13 fathoms, coral bottom, the Feer mosque bearing 95°, that of Langiar 150°, and Weduar Point 198°, the 3-fathoms-limit being 125 M. distant.

The reef North of Feer is marked by a beacon; it continues in a Southsouthwesterly direction as a ridge with 10 to 14 fathoms on it, Eastward of which, nearer to the shore, the depth again increases until 20 and 24 fathoms.

According to our observations the South point of Nuhu Roa (Little Kei) extends about 1 mile more to the Southward than is shown on Dutch chart N° 162.

At a distance of only 5 miles Southeast of the South point of Nuhu Jut (Great Kei) the lead showed a depth of 1681 fathoms.

90. **Dobo Anchorage,** Aru Islands. 21. XII. 1899. (Stat. 272). On both sides of the channel beacons are placed, they are however few in number and those of the South side are not easily sighted. The reef on this side does not show at high water. The beacons should not be approached too near, as they are placed in rather shoal water.

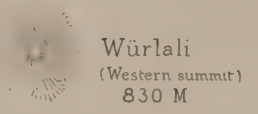
The course in the channel is 112°.5 (E.S.E.) throughout, exactly on Fanadjuring Point. When in the entrance of the channel, this point is seen nearly midway between Merukudjuring Point and Dobo Point, somewhat nearer to the former.

It should be remembered that the flood stream in the Western part of the channel strongly sets towards Wammer, until Malakafani Point bears N.N.E.

Coursing in the line above mentioned the smallest depth, 5 fathoms, was found in the entrance, where however more water may be found by first coursing somewhat to the Southward of the said line, until Ular Point bears well to the Westward of South.

Wasir Strait. 23. XII. 1899. The figuration of this Strait on the Dutch chart (Schetskaart N° 6) is not correct, bearings not agreeing on it. According to the Dutch sailing directions and still more than might be concluded from them, it is necessary to keep on the Wasir side of the Strait. There too however the "Siboga" passed between patches of discoloring water. Although no less than 8 fathoms were sounded on this occasion it was guessed, that the smallest depth on those patches may have been about 4 fathoms.

91. **Kulewatti (Sollot-) Bay,** Dammer Island. 9. I. 1900. Plate XIV. (Stat. 277). The Northwestern part of this bay affords good anchorage in the West monsoon. In all the rest of the bay great depths are found.



KULEWATTI BAY.

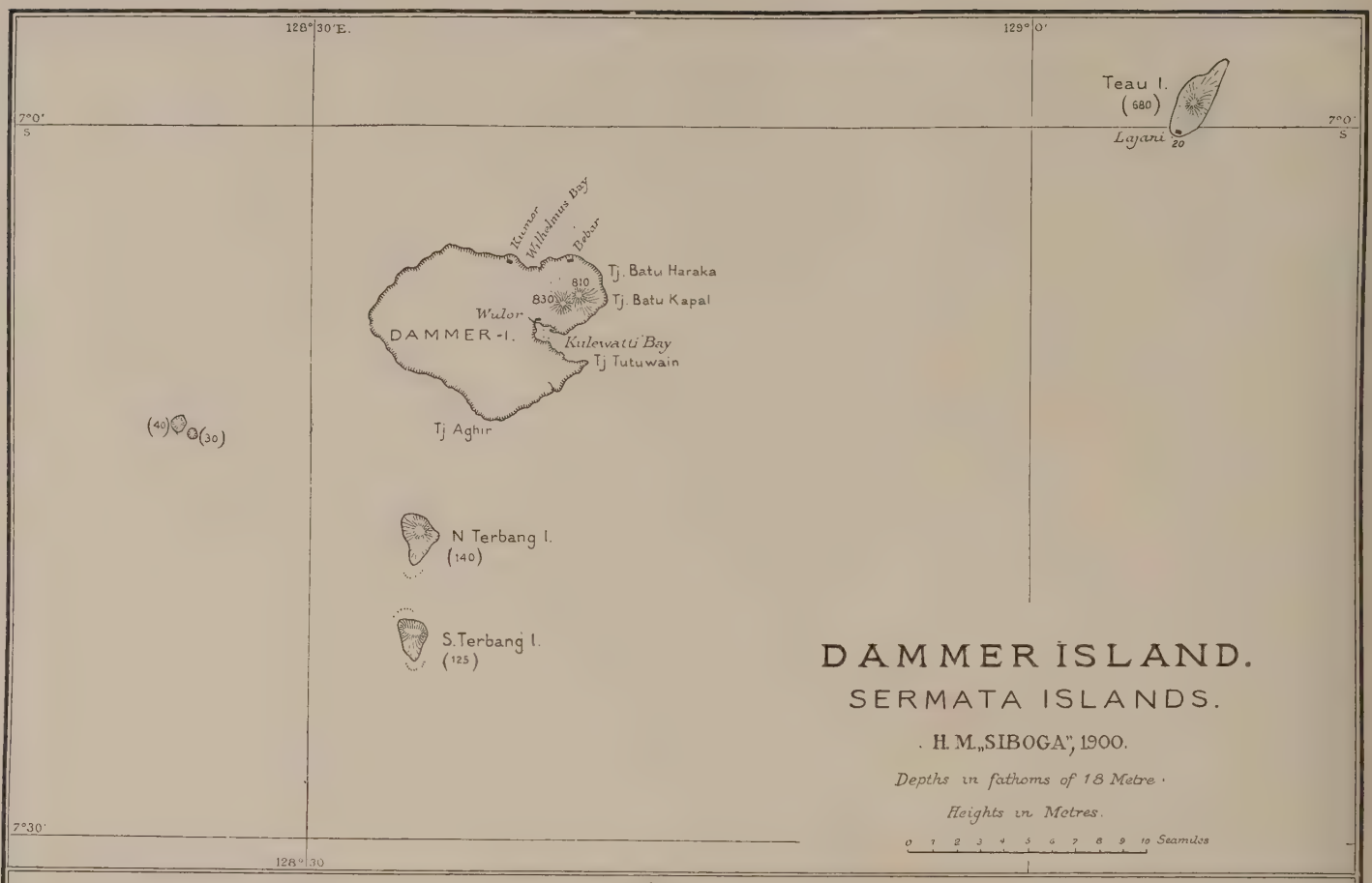
DAMMER ISLAND.

SERMATA ISLANDS.

H.M.„SIBOGA", 1899.

Depths in fathoms of 1.8 Metre

Heights in Metres



DAMMER ISLAND.

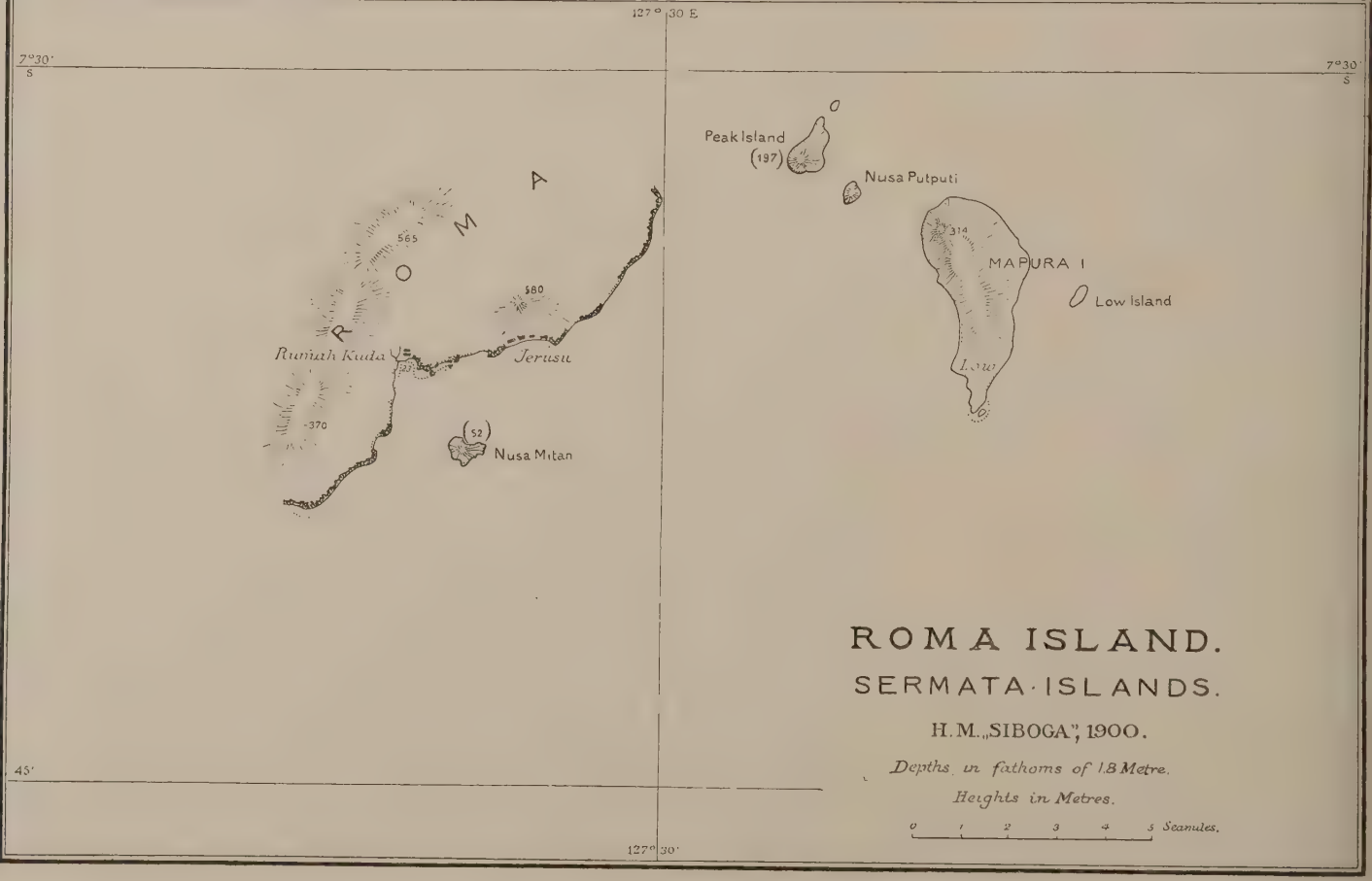
SERMATA ISLANDS.

H. M. „SIBOGA", 1900.

Depths in fathoms of 1·8 Metre.

Heights in Metres.

0 1 2 3 4 5 6 7 8 9 10 Seamiles



ROMA ISLAND.

SERMATA ISLANDS.

H. M. „SIBOGA", 1900.

Depths in fathoms of 1·8 Metre.

Heights in Metres.

0 1 2 3 4 5 Seamiles.

Coming from the Northward the coast may be followed at a distance of a few cables, taking care of the reef, which extends between Kilie and Sollot, which is rather steep-to, but well visible. Wulur village bearing about N.W. by N., it may be steered for until the anchorage, which is in 16 to 23 fathoms, sand and stone, Sollot Point bearing 45°, nearly in line with Mount Würlali. Coming from the Southward a course about 284° may first be taken on the flat hill which is to the left of Wulur, this village being not yet visible then.

Mount Würlali (Sulphur mountain) is a volcano with several peaks, the highest of them, which is also the most wooded, being 830 M. in height. It is still active, although no eruption has taken place for a long period.

On the Southeast side of the top sulphurous vapours may generally be seen. In many places of the shore are springs of hot water, one being at the entrance of the creek South of the village. The water of this creek is used for all purposes although is has a slight tinge.

The steamer of the "Koninklijke Paketvaart" which calls at Dammer every two months, anchors in Kulewatti Bay in the West monsoon, and at Batu Merah on the Northwest coast in the East monsoon.

To the South of Dammer there are two small islands (Plate XV), North and South Terbang; the South point of the latter being somewhat upwards of 10 miles distant from the South point of Dammer. North Terbang is 140 M. in height, the highest point being somewhat to the North of the centre. Off the South point a reef seemed to extend. South Terbang consists of a plateau 125 M. in height, sloping down towards the South point, but having a steep fall on its Northern side, where the island is low. From the North and South points of this island reefs seemed to extend. When passing Eastward of these islands at a distance of 3 to 4 miles no other dangers were seen.

S.W. by W. 9 miles from the West point of Dammer there are two low, wooded islets, 30 and 40 M. in height.

92. **Roma Island.** 11. I. 1900. Plate XV. (Stat. 279). The "Siboga" found good anchorage in Rumah Kuda Bay on the Southeast coast of Roma, in 23 fathoms, sand and mud, the extremities of Nusa Mitan bearing 139° and 156°, the South point of Mapura Island nearly in line with the Eastpoint of the bay 95°, and the outer landpoint to the Southward 195°.

This bay affords tolerable shelter in the West monsoon but it is narrow, the bottom being steep and the space sufficient for one ship only.

Off the East point of the bay a reef extends rather far Southward; it is cleared by taking a Northnorthwest course on the midst of the sandy beach of the bay, the Westpoint of Nusa Mitan then bearing nearly right astern. The plan on Dutch chart N° 153 is rather correct. From Rumah Kuda Bay a valley trends in a Northerly direction.

Off the Southpoint of Roma a reef extends, on which a small rock emerges close to the shore.

According to informations given by the natives there are several villages, viz. on the West coast, beginning from the Southward: Oirwakèka, Diur, Laarwanie and Hiela; on the

Southeast coast: Rumah Kuda, Djerusu and Jatuna. Close to the East of Djerusu and nearly forming part of it, is the small village of Jatwéwar.

At Djerusu there is anchorage with moderate depths. Northward of this village is a conspicuous top 580 M. in height. The Northwestern part of the island is 565 M., the Southwestern part 370 M. in height; Nusa Mitan 52 M.

Roma produces plenty of sheep and goat.

The entrance of the creek in Ruma Kuda Bay was stated to be in lat. 7° 36′.1 S. and long. 127° 24′.7 E.

The figuration of the islands Eastward of Roma is given incorrectly by the charts. (See Plate XV). Mapura is low in the Southern part; the Northern part is rather high, having a peak of 314 M. near its Northwest point. Laag Island, a low, small island, lies Eastward ot the centre of Mapura. Nusa Putputi and Piek Island, the latter 197 M. in height, lie to the Northwest of Mapura.

93. **Letti, Moa and Lakor Islands.** 14. I. 1900.

Letti consists of a hilly central part, surrounded by a border of flat land, the latter 50 to 60 M. in height. The apex of the island, situated not far to the West of the centre, is 428 M. above the sea-level.

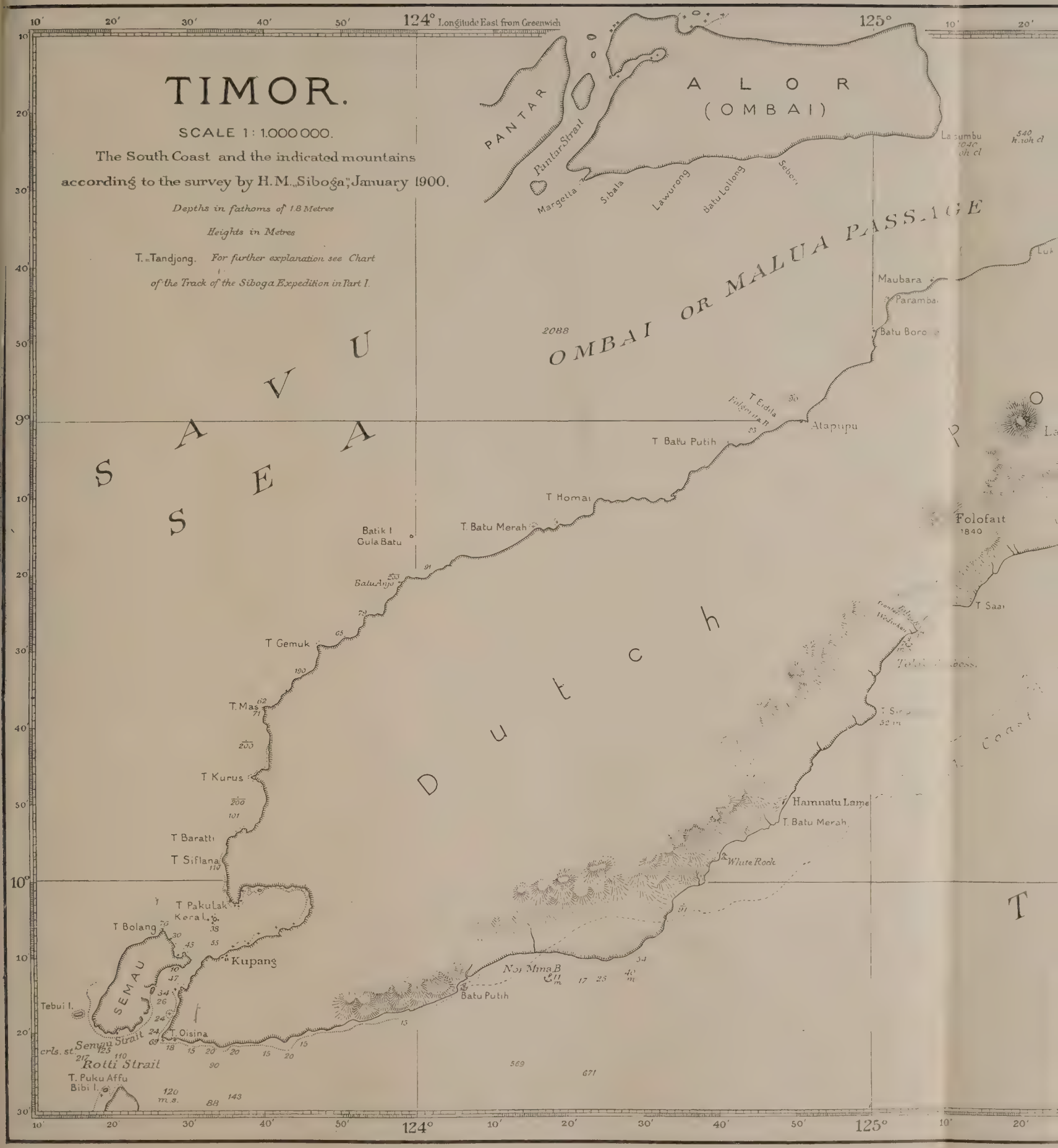
Moa is for the greater part only about 50 to 60 M. in height with two separate ranges of hills, one in the Western part of the island, rising to a height of 300 M., the other somewhat less extensive but higher in the Eastern part, the highest top of which is the Gunong Karbou, a flat, conical hill, 400 M. high. It did in no way show a resemblance with the Peak of Teneriffe, as is mentionned in Findlay's directory.

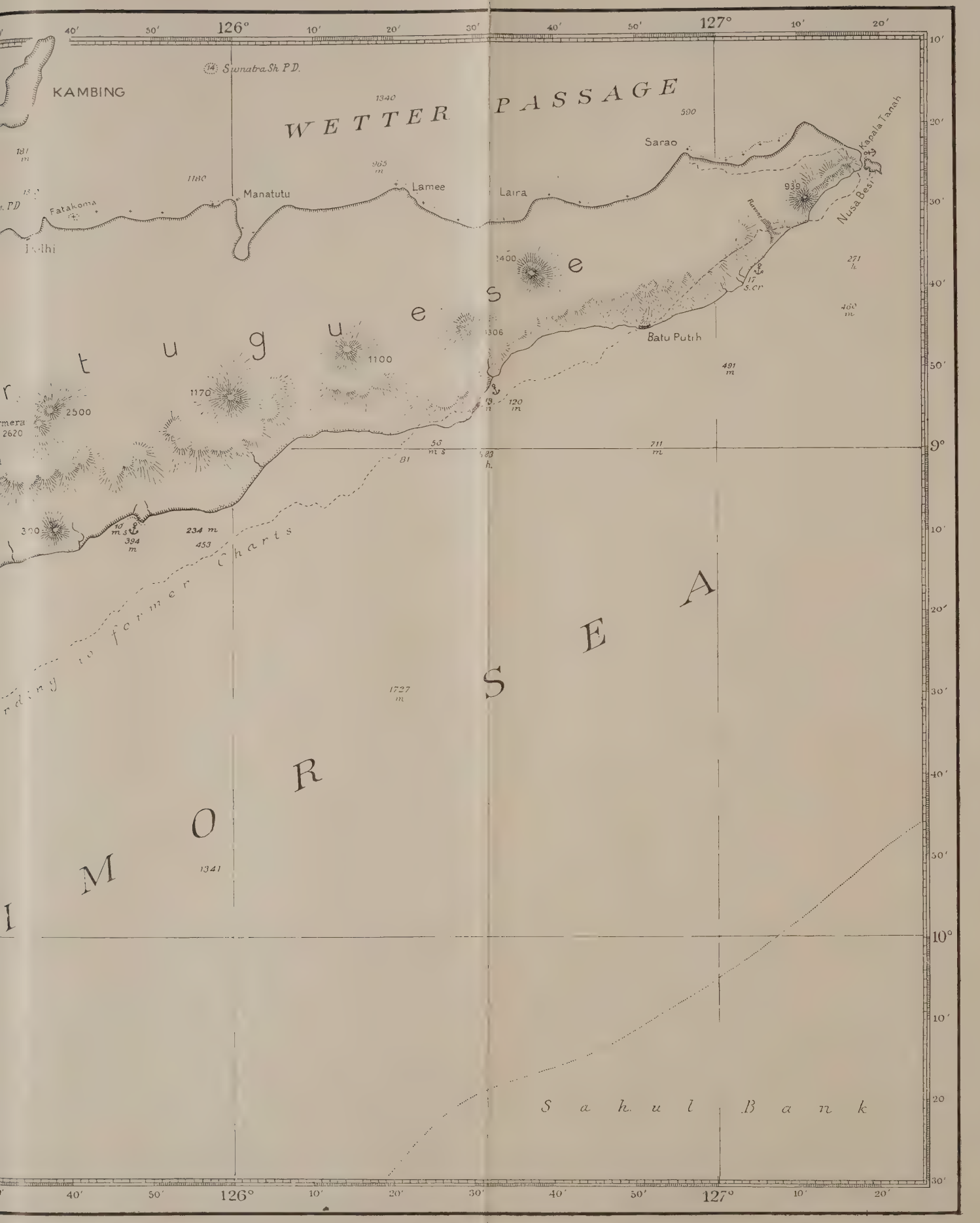
The hilly ranges of Letti and Moa are covered with low trees and shrub; the lower parts, which have a coralline appearance, are grown with higher trees.

Lakor is a low, flat island throughout, the tops of the trees being about 50 M. above the sea level, and looks like an ancient coral terrace.

The strait between Moa and Lakor was passed without seeing any indication of danger, except the reefs projecting off some of the landpoints, especially off the Northeast and Southeast points of Moa and off the Southwest point of Lakor. In the Northern part of the strait, on the Moa side, no bottom was found at 50 and 60 fathoms. Contrary to the assertion ot Findlay's Directory no anchorage was found on the Southeast coast of Moa, this coast however not being examined throughout, so that there may exist some.

Close to the Southward of a landpoint, situated halfway the strait, 30 fathoms of depth were found at a distance of 100 M. from the bordering reef. On account of the very steep bottom and the whirlpools, caused by a violent tide, this spot, which seemed to be the best in that vicinity, could neither be used as an anchorage.


TIMOR.
SCALE 1 : 1.000 000.
The South Coast and the indicated mountains according to the survey by H.M. „Siboga", January 1900.
Depths in fathoms of 1.8 Metres
Heights in Metres
T. = Tandjong. For further explanation see Chart of the Track of the Siboga Expedition in Part I.
124° Longitude East from Greenwich
125°
PANTAR
Pantar Strait
A L O R
(O M B A I)
Margetta
Sibala
Lawurong
Batu Lolong
Selbert
Lasumbu
OMBAI OR MALUA PASSAGE
Maubara
Paramba
Batu Boro
2088
T Eidila
Atapupu
T Batu Putih
T Homai
T. Batu Merah
Batik I
Gula Batu
Batu Anjo
T Gemuk
T. Mas
T Kurus
T Baratti
T Siflanai
Folofait
1840
T Saar
Hammatu Lame
T. Batu Merah
White Rock
T Pakulak
Kera I.
T Bolang
Kupang
Nai Mina B
Batu Putih
Tebui I.
SEMAU
T. Oisina
Semau Strait
Rotti Strait
T. Puku Affu
Bibi I.
S A V U S E A
Dutch
T


126°
127°
KAMBING
WETTER PASSAGE
Sumatra Sh P.D.
Manatutu
Lamee
Laira
Sarao
Kanala Tanah
Nusa Besi
Fatakoma
Batu Putih
1340
1180
965 m
590
930
1400
1100
1170
2500
306
491 m
711 m
120 m
234 m
453
394 m
1727 m
1341
S E A
S
R
O
M
I
Sahul Bank
9°
10°

The West coast of Lakor trends inward instead of outward as is noted on the chart. In the Southern part of this strait the lead was kept going without reaching the bottom at 12 fathoms.

94. **South coast of Timor.** 15—26. I. 1900. Plate XVI. (Stat. 282—296). On account of the great doubt, which soon rose as to the accuracy of the configuration of this coast line, as shown by the charts, it was decided to gather as many data as possible, which could serve as a control. Although the operations intended for the deep-sea work did not permit of verifying all the details of the coast, its general outline and most salient features could be traced with sufficient accuracy. At first the plan adopted for the deep-sea work would have caused the ship to pass by part of the coast during the night, but when it resulted from the hydrographic work, that the deficiencies of the chart were still much greater than they were expected to be, the leader of the expedition preferred to sacrifice part of the zoölogical work rather than have a gap in the survey. Consequently this plan was altered so as to permit the accomplishing of an uninterrupted running survey of the South coast of Timor, comprised between the Northeast point of the island and the West point of the Noimini (Noi Mina) Bay, a distance of a round 240 seamiles.

The observations consisted in the first place in fixing the positions of seven anchorages in the close vicinity of the coast; further in a great number of compass bearings of mountains, landpoints, river entrances, etc., taken from those anchorages and when under way. The repeated measuring of the altitudes of mountains, many of which are very conspicuous, especially in the Portuguese part of Timor, served as a control to the other observations.

As for the names of landpoints, mountains, rivers, etc. nearly no informations could be got, on account of the contact with the inhabitants being very scarce. Wherever no doubt seemed possible the names noted on the existing charts and the informations procured by H. D. M. "Java" in 1898 were accepted.

The stations, which formed the basis of this survey were situated as follows (I—VII):

I. 15—18 January. In a point on the Northwest coast of Nusa Besi, where the left extremity of Kisser Island is in line with the extreme point of Timor. Suns altitudes in artificial horizon A. M. and P. M., the difference of the azumiths being 117°.

Position: Lat. 8° 25′.3 S. and long. 127° 18′.9 E.

Position of anchorage reduced from former position:

Lat. 8° 25′.2 S. and long. 127° 18′.4 E.,

this anchorage being in 13 fathoms, sand and coral, in the Northern entrance of Nusa Besi Passage, 400 M. distant from the Timor coast.

From this anchorage astronomical bearings were obtained of Kisser, Letti and Moa (Gunong Karbou).

1) The running survey of this coast by the "Siboga" has been introduced in the Dutch charts (N° 112) in 1900. The figuration of the West and North coasts of Timor is based on very accurate astronomical observations at Timor Kupang, Haingsisi, Pulu Tikus, Kampong Baratti, Tandjong Gemok, Pulu Batik (Gula Batu), Tandjong Batu Putih, Atapupu and Timor Deli. The coast from Timor Kupang to Sutrana River was surveyed in 1897 by Commander W. A. Mouton of H. D. M. "Borneo".

II. 18—19 January. Anchorage in 17 fathoms, sand and coral-bottom, about 300 M. distant from the shore and 175 M. from the edge of the reef (6-fathoms-limit).

Position, by dead reckoning, compass bearings and altitudes of mountains:

Lat. 8° 39′.1 S. and long. 127° 4′.4 E.

III. 19—20 January. Anchorage in 13 fathoms, mud, 1000 to 1200 M. distant from the shore and 600 M. from the edge of the reef. Position by altitudes of sun and star (Achernar), taken on board:

Lat. 8° 54′.3 S. and long. 126° 31′.8 E.

IV. 20—21 January. Anchorage abreast a river entrance in 10 fathoms, mud and sand, 1000 M. distant from the shore and 1500 M. distant to the S.E. by S. of some huts, situated to the West of the entrance. Position by stars altitudes (λ Argus and α Crucis), taken on board:

Lat. 9° 9′.5 S. and long. 125° 48′.3 E.

V. 21—23 January. Anchorage in 7 fathoms, mud and sand, not far from the Dutch-Portuguese fronteer, the distance from the coast being about 1500 M. Position by altitudes of sun and star (α Centauri) in four different azimuths:

Lat. 9° 29′.7 S. and long. 125° 4′.2 E.

VI. 23—24 January. Anchorage in 11 fathoms, mud, at a distance of 3 to 4 miles from the coast, nearly in the centre of Noimini Bay. Position by altitudes of Venus and Achernar, in connection with compass bearings of Batu Putih:

Lat. 10° 12′.7 S. and long. 124° 18′.4 E.

VII. 24—27 January. Anchorage near Batu Putih, the West point of Noimini Bay, in $4^1/_4$ fathoms, sand, 600 M. distant from the shore. Position by altitudes of the sun, Achernar, Canopus and Sirius:

Lat. 10° 14′.0 S. and long. 124° 5′.5 E.

Position of Batu Putih (highest point of white bluff), as reduced from former position:

Lat. 10° 14′.5 S. and long. 124° 5′.4 E.

The following particulars were noted concerning this coast:

The general direction of the coast between Nusa Besi and the Portuguese fronteer is almost S.W. by W., thence until the East point of Noimini Bay, it trends nearly S.W. In some places the coastline recedes over a distance of 20 to 30 miles, but there is nowhere a bay or bight, which affords shelter against the East monsoon.

Navigation on this coast offers no difficulties, no indication of isolated dangers having been observed. It should however be noted here, that in some parts of the coast between Nusa Besi and the meridian of 126° E. the "Siboga" did not come within a distance of 8 miles, so that of course dangers lying within these areas might have been passed unseen. This however seems very improbable on account of the general nature of the sea bottom, as stated by the soundings.

From the meridian of 126° E. longitude until Batu Putih we navigated so near to the coast, that it was almost impossible to overlook any danger, if existing, the nature of the bottom in this part also rendering such existence very improbable.

The depths, which at a distance of 3 to 5 miles from the coast are over 200 and 400 fathoms, were generally found to gradually decrease towards the land. Within a short distance nearly everywhere anchorage seems to be found, which circumstance is probably due to the deposits of a great number of rivers and creeks.

Sudden changes from great depths into steep, shallow reefs were observed nowhere. Abreast and to the South of Batu Merah however, where the lead did not reach the bottom at 81 fathoms at a distance of $1^1/_2$ miles from the shore, the steep slope of the rocks suggested the idea that there is no anchorage to be had.

During the stay of the "Siboga" no strong sea-winds were experienced and only little sea or swell, landing being possible on any point of the coast, but when the East monsoon is blowing a heavy surf is sure to prevail. Perhaps on account of this the shores are nearly everywhere uninhabited, whereas in many places the hills and mountains are well populated and cultivated. Fishing-boats were seen nowhere, except a very small number in the Nusa Besi Passage, where some fishing seems to be carried on under cover of Nusa Besi; for the rest the only fishing seems to be done by capturing animals on the bordering reefs with the aid of pointed sticks, baskets and such primitive tools.

As far as could be stated these reefs and the banks projecting off some landpoints and outside the river-entrances do nowhere extend further from the shore than a distance of about 600 M., except in Noimini Bay, where moderate depths were found within a few miles from the shore.

In the West monsoon discoloring of the water was seen in many places near the coast, which always appeared to be caused by riverwater.

Especially in the Portuguese part of Timor high and conspicuous mountains are situated near the South coast, the higher parts of which mountains are generally less densely wooded than those in other parts of the East Indian Archipelago.

Nusa Besi Passage is about 700 M. wide in its narrowest part. There are no dangers, except rather narrow bordering reefs on both sides, which are well visible by the discoloration of the water. The navigation of this passage is easy, a straight course leading through, and the depths being over 10 and 12 fathoms, 13 to 15 fathoms in the narrows.

In the Northern entrance, towards which the depths gradually decrease, the "Siboga" anchored in 13 fathoms, sand and coral, the North point of Nusa Besi bearing 94° and the extreme East point of Timor 187° (Anchorage I).

Nusa Besi Island, or Nusa Mesi, as it was called by the natives of this part, is uninhabited; it is flat, and rather low. From the North point a reef projects a distance of some cables. The tidal currents were found to change regularly, the current to the Northward however lasting longer than that to the Southward. The velocity of the current amounted to 3 knots, sometimes for a short period even to 4 knots per hour. In both tides the sea at the lower end of the passage was always turbulent.

The Northeast point of Timor is called Kapala Tanah by the natives, who at first were very shy. According to their informations there are two villages up hill, at some distance from the coast, called Djemoro and Tuwalla.

This point has a rather high, straight ridge, ending in a vertical bluff, outside of which there is a border of low land about one mile in breadth. This ridge continues in a Southwesterly direction, changing there into a range of rugged, rocky summits, the highest of which, 939 M. in height, is about $1^1/_2$ miles from the coast. In the surroundings of Nusa Besi passage the coast is generally rocky and much worn out by the surf.

N.E. Point of Timor. Peak N. 40° E.

Nusa Besi
East Point bearing N 53° E.

Still more to the Southwestward the land is hilly and of moderate height near the coast, in some places low and bordered by a sandy shore. The lontar palm, which is very common throughout whole Timor, grows in great number in this neighbourhood.

At a distance of 14 miles from Nusa Besi there is a conspicuous ravine. Another 5 miles further to the Southwestward the "Siboga" anchored at 300 M. distance from the shore in 17 fathoms, sand and coral (Anchorage II). Some cables more to seaward the lead showed 26 fathoms. In this locality the coast has a sandy beach, bordered by a narrow coral reef.

35 Miles distant from Nusa Besi the hills continue until the coast, forming a conspicuous, brightly colored bluff, called Batu Putih. From here the coast trends inward over a distance of 25 miles until a rather low point, situated in longitude 126° 30′ E. At about 3 miles North of this point the "Siboga" anchored in 13 fathoms, mud, (Anchorage III) the lead having shown 23 fathoms at $1^1/_2$ miles from the shore, which, abreast the anchorage, is composed of red sand and low rock. 6 Miles North of this point there is a river entrance. The hills near the coast are populated and cultivated.

About the middle of the bight above mentioned and at a distance of 9 miles inland there is a very conspicuous montain, 2400 M. in height, the summit being composed of steep, barren rock, and the only one of this height in these surroundings.

Another mountain, nearer to the coast, is 1300 M. in height. From the anchorage these summits bore 16° and 348° respectively.

Proceeding further Westward the coast was again found to trend inward over a distance of largely 30 miles until the meridian of 126° 0′ E. In this part the coast is generally low and bordered by sandy beaches. From the coast the country gradually rises towards two mountains, standing at about 10 miles inland, and being 1100 and 1170 M. in height respectively.

To the West of the landpoint, situated in longitude 126° 30′, moderate depths were found, the lead showing 56 fathoms at about 2 miles and 81 fathoms at 4 miles from the

coast. To the West of the landpoint, situated in longitude 126° 0′, the bottom is more steep, the depth being 234 fathoms at a distance of 3 miles from the shore. 12 Miles to the Westward of this point the "Siboga" anchored in 10 fathoms, mud and sand, abreast a river entrance, on the West side of which some huts were seen. (Anchorage IV) Here also the depths increase rapidly, the lead showing 394 fathoms at 3 miles from the coast. Close Eastward of this river entrance there is a low landpoint, from which a bank extends at least 400 M.

Northwestward of this river and about 17 miles inland the mountain range reaches its greatest height in Mount Ermera, which has two tops, the Southernmost 2620 M., the Northernmost 2500 M. in height.

To the Westward of the meridian of 126° 0′ E. till near Tandjong Saai, a distance of largely 40 miles, the coast trends in a Westsouthwesterly direction. In this part and also more to the Westward, until past the Dutch-Portuguese fronteer, the country is generally hilly, being 200 to 300 M. in height until at a short distance from the coast, which is low. A large number of rivers and riverlets intersect this part of the coast.

Near Tandjong Saai, which is a low landpoint, a rather conspicuous mountain, called Folofait, 1840 M. in height, is situated 12 miles from the coast. Between the range to which it belongs and that of which Mount Ermera forms part, the country is comparatively low. Over this lower part, which extends in a Northnorthwesterly direction, a mountain of a very peculiar shape was seen. The approximate position of this mountain, the name of which is Lamakitu, is in lat. 9° 18′ S., long. 125° 24′ E. It looks like a gigantic mass of rock, very steep, especially on its Northeastern side. The height, which could not be ascertained on account of the clouds covering the summit, was estimated to be several hundreds of Metres.

Mount Lamakitu, bearing about N.N.W.

About 8 miles Northward of Tandjong Saai, where the coast trends inward, a sounding of 76 fathoms was obtained at 1 mile from the shore.

The "Siboga" anchored at about 11 miles to the Southwest of Saai Point in 7 fathoms, mud, (Anchorage V), in a position, which afterwards appeared to be quite near to the Dutch-Portuguese fronteer. This fronteer was stated in 1898 by H. D. M. "Java" to be at Talus River, which very probably is the river on the North side of a landpoint, close South of which the "Siboga" anchored, another river nearer to the anchorage in that case being the Wedieken. No absolute certainty however could be got about the situation of the fronteer, there being no reliable marks and no inhabitants to afford information.

The astronomical positions of Talus River entrance, as stated by H. M. "Java" and "Siboga" respectively, only differ by 1′½′ in latitude and ½′ in longitude.

In the vicinity of this anchorage the hills extend till the coast. More to the Southward, until close to Batu Merah Point, which is 38 miles distant from Saai Point, the country is low over a distance of several miles inland, especially near Siripinang Point, a protruding low landpoint, 12 miles to the Southwestward of the fronteer. This point is situated on the South side of a bight, called Telok Moabessi, and at first looks like a low island, when seen at

some distance from the Northeast. Abreast this point the lead showed 52 fathoms at $1^1/_2'$ miles from the shore. A great number of rivers and riverlets were seen in these surroundings, which abound with tjemara and lontar trees.

Close to the North of Batu Merah Point some huts were seen, belonging to the village of Hamnatu Lama.

In the vicinity of this point the coast is steep and high, the height of the mountains not far inland being estimated at 600 to 700 M.

Batu Merah Point is the Northernmost of four bluffs, situated close to each other, South of which there is still an other one, near which some rocks uncover close to the shore. The hills and mountain-ranges in this neighborhood are well cultivated and inhabited.

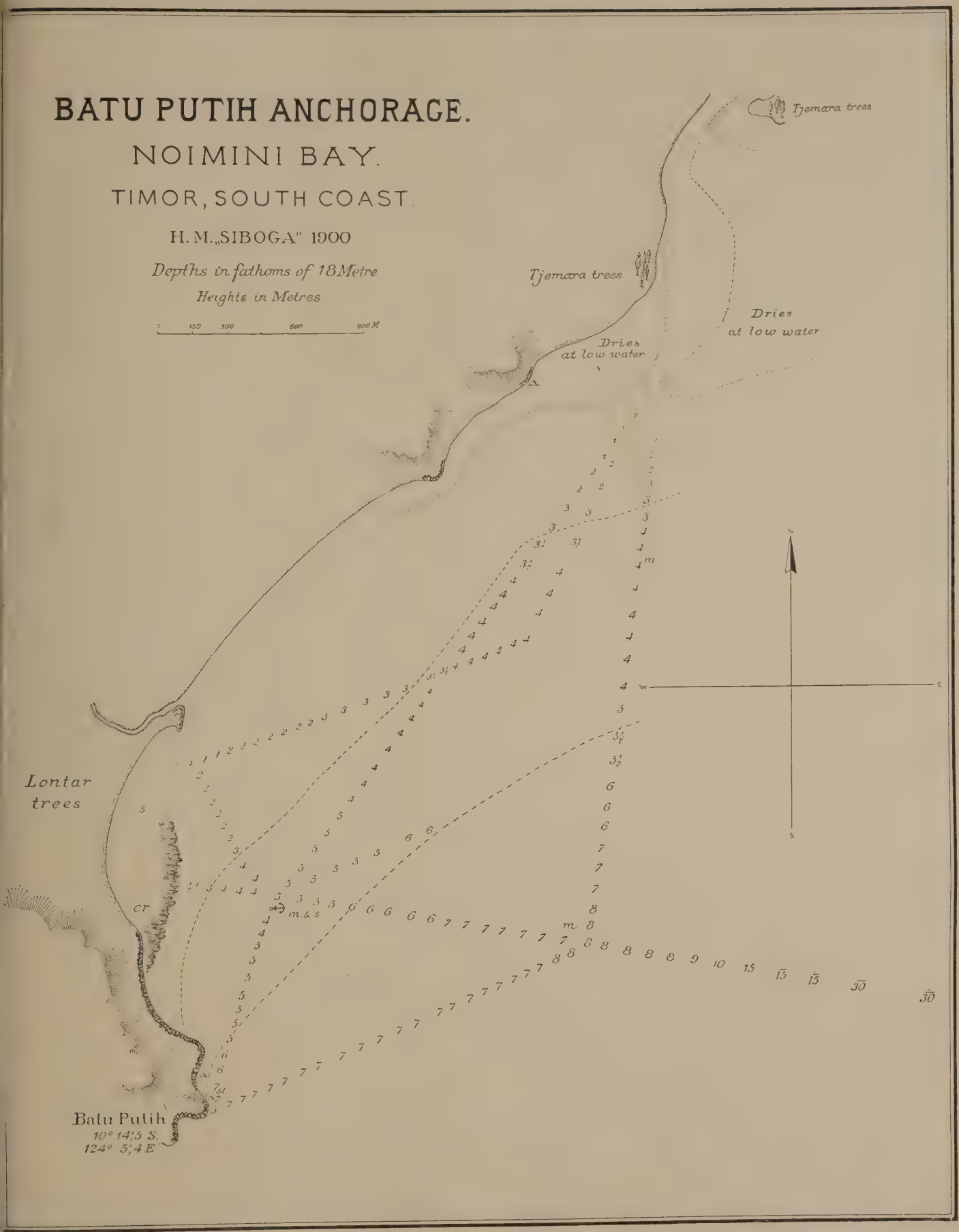
From 20 to 30 miles to the Southwestward of Batu Merah the coast gradually takes a Westerly direction, thus forming a broad, low landpoint, on the Eastern part of which the sands of the shore are white, those of the shore more to the Westward being of a reddish color. To the Westward of this point the coast trends inward over a distance of some 18 miles. The Western limit of this bight, which is called Noimini (Noi Mina) Bay, is formed by a steep and white rock, Batu Putih, 68 M. in height, very conspicuous, when seen from the Northeast or East.

Abreast the low point on the East side of Noimini Bay a depth of 54 fathoms was found at a distance of $1^1/_2$ miles from the shore. More to the Westward of this point the depths gradually decrease, affording good anchorage with muddy bottom (Anchorage VI).

95. **Batu Putih Anchorage.** 24. I. 1900. Plate XVII. (Stat. 296). A good shelter in the West monsoon was found near Batu Putih in $4^1/_4$ fathoms, sand and mud, (Anchorage VII),

Batu Putih, Noi Mina Bay.

the end of Batuh Putih bearing 197°, an isolated rock on the shore 337°, another bare rocky point more to the Eastward 22°. At a short distance to the East of this last named point is the mouth of Noimini River, the bar of which uncovers at low water.


BATU PUTIH ANCHORAGE.
NOIMINI BAY.
TIMOR, SOUTH COAST.
H. M. „SIBOGA" 1900
Depths in fathoms of 1.8 Metre
Heights in Metres
0 150 300 600 900 M
Tjemara trees
Tjemara trees
Dries at low water
Dries at low water
Lontar trees
cr
m. & s.
Batu Putih
10° 14′.5 S.
124° 5′.4 E
N
W
E
S

SOUTH COAST
OF
ROTTI ISLAND
H.M. „SIBOGA", 1900.
Depths in fathoms of 1.8 Metre.
Heights in Metres
0 1 2 3 4 5 6 7 8 9 10 Seamiles
123°0' E.
10°30' S
LANDU
USU ISLAND
Telek Pupela
47 m
OPAU
Tj Manuoi
GG Lakemolah
266
ROTTI
230
234
Highest point
G A Lai
445
Pillar
Highest point
Rocky cliff
197
228
Hill
106
10°32 S
123°15 E
Lai
Buka (Cyrus) Bay
Tj Puleh
128
610 m

BUKA (CYRUS) BAY.

ROTTI ISLAND.

H.M. „SIBOGA", 1900.

Depths in fathoms of 1.8 Metre..

When within the limit of 20 fathoms the depths slowly decrease towards the shore, so that then a Northnorthwest course may be taken on the isolated rock until the required depth is reached. Close to the North of Batu Putih the shore is fringed by a coral reef, North of which boats find a suitable landingplace. Near the isolated rock is the entrance of a river. The coast of Noimini Bay is generally low except near Batuh Putih, West of which the hills again extend until the shore.

A bay with islands, as shown on Adm. chart N^{0} 942^{A}, does not exist in these surroundings.

96. **South Coast of Rotti Island.** 27. I—2. II. 1900. Plate XVIII. (Stat. 297—302). The South coast of Rotti, East of Buka Bay, is hilly and in some parts steep and rocky. Its general direction is E.N.E. and N.E. by E. 9 Miles to the Eastward of Nusa Lai there is a broad, protruding landpoint, called Tandjong Puleh. Between this point and Nusa Lai the coast trends inward. Nearly in the midst of this bight there is a steep and conspicuous rocky bluff, 197 M. in height. Near Tandjong Puleh the country some miles inland consists of a flat range, reaching its greatest height of 445 M. in Gunong Ai-Lai. It gradually descends towards Tandjong Puleh, the coast of which consists of low rock, intersected by sandy beaches. When passing by this point at a distance of 3 miles no isolated dangers were seen.

East of this point the coast trends inward until Tandjong Manuoi, situated 14 miles to the Northeast of Puleh Point. On this part of the coast, which is generally low, are three broad hills; the Northernmost, called Gunong Lakemola, is 266 M. in height, the two others 230 and 234 M. respectively.

Manuoi Point is rather low; it generally consists of coral sand with patches of low rock. Near this point there is a flat hill.

From Manuoi Point the coast trends in a Northwesterly and Westnorthwesterly direction. Between this part of the coast and that of the peninsula Landu, to the Northeast of Rotti, there is a narrow inlet, called Telok Pepela, separated by a low isthmus from Karbaffo Bay, situated on the West coast of Rotti.

Off Manuoi Point a broad coral reef extends, which uncovers at low water. The approach does not seem to be very steep the lead showing 52 fathoms at 1 mile to the Southeast, and 37 fathoms, sand and coral, at 1 mile to the Northeast of this point.

No isolated dangers were seen on this part of the coast.

The coast of Rotti to the Northwest of Manuoi Point is fringed by extensive coral reefs, in consequence of which Telok Pepela at low water seems to be quite barred by them on this side. According to the saying of the inhabitants ships of some size would neither be able to proceed far into this bay on the Landu side.

97. **Buka or Cyrus Bay,** Rotti, South Coast. 27. I. 1900. Plate XIX. (Stat. 299). Buka Bay extends over 4 miles East and West and 3 miles North and South. Its South and East sides are partially shut in by islets and rocks. The two Northernmost of them are Nusa Lai and Batu Tilluk, South of which is the broad and deep entrance to the bay.

The shores of the bay, which are in most parts fringed by shallow reefs and banks, consist of rock, intersected by sandy beaches and mangrove.

Nearly in the centre of the bay are two reefs of some extension, the Easternmost called Karang Makemu, the other Karang Naru. Between Karang Makemu and the reef, which projects from the Northern shore, is a channel, 600 M. wide, with a depth of 15 fathoms, leading to the inner part of the bay, in which the depths gradually decrease. The bottom is solid mud.

In the Northwest part of the bay are two rocky islets, the Easternmost, Batu Tua, surmounted by a white stone beacon, visible from the offing. The ordinary anchorage is in 5 to 7 fathoms, the beacon bearing N.W.

In the East monsoon however better anchorage and better landing place may be found more to the Southward, West of Karang Naru.

To enter the bay take a Westerly course, leading about $^1/_2$ mile distant South of Batu Tilluk, whence a course about N.W. $^1/_2$W. on the right side of a broad, flat hill, will lead clear of Karang Makemu.

This course is kept until the first rocky border in the background of the bay to the left of Batu Tua bears 288°, whence this border is steered for.

98. **Manuoi Anchorage,** Rotti, East Coast. 30. I. 1900. Plate XX. (Stat. 301). A good anchorage was found North of Manuoi Point in 12 fathoms, coral bottom, this point bearing 158°, Batu Luak 276°, a rocky point 193° and Lakemola Hill 222°, Batu Luak then being in line with a small, flat, conical hill, which may also be used as a leading mark for steering for the anchorage, when coming from the Eastward.

Until the depth of 15 fathoms the bottom is rather steep; within this depth soundings gradually decrease towards the reef. The bottom affords good holding ground.

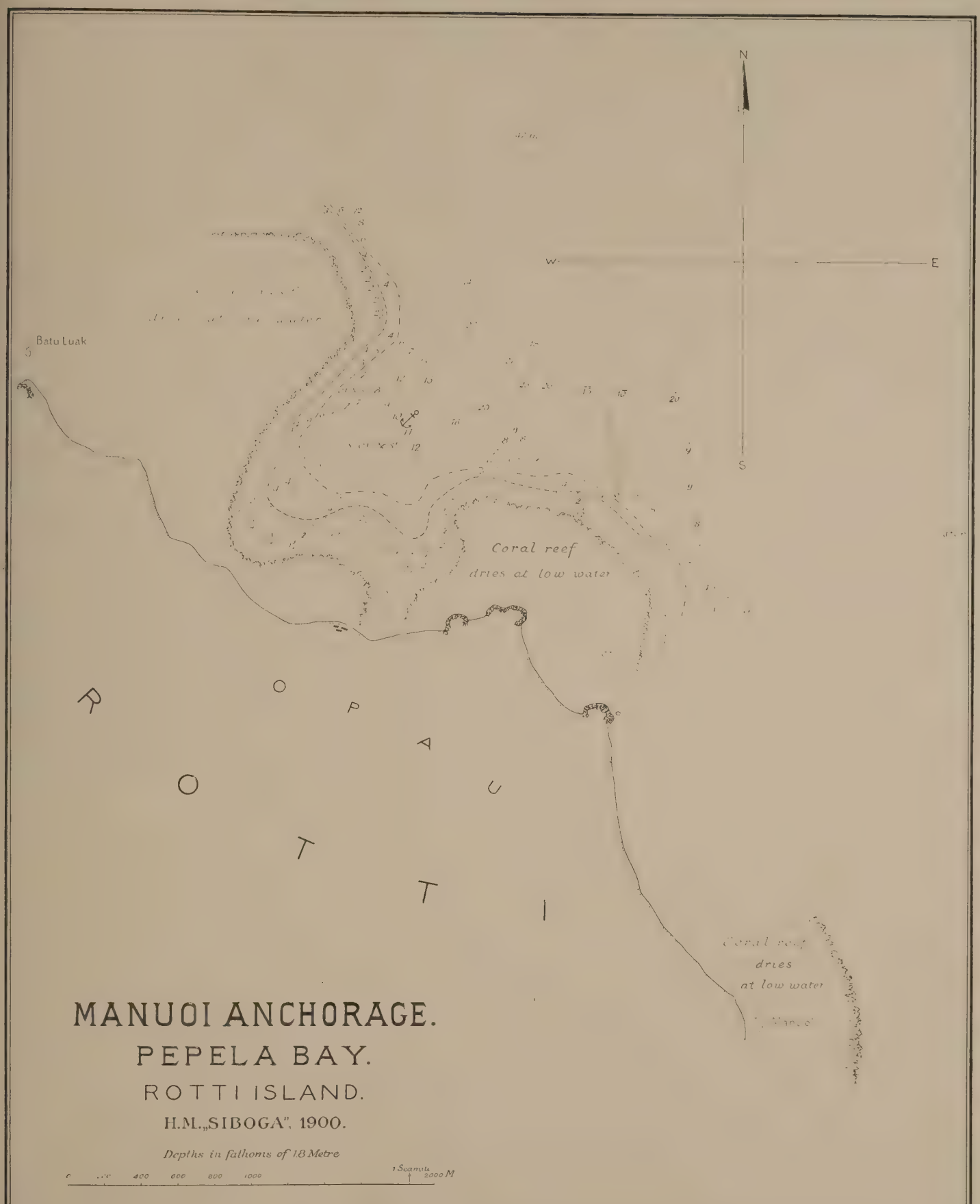
Close to the West of this anchorage the reef trends inward and in one spot is quite absent. Abreast this spot, where boats may land in each tide, there is another good anchorage nearer to the shore in 10 fathoms, sand, over a space of about 700 M.

One mile inland the village of Opau is situated.

99. **South Coast of Flores.** 10. II. 1900. This coast is mountainous nearly throughout. At a distance of about 20 miles to the West of Mount Lobetobie, not far from the coast, there is a high conical volcano with a narrow, flat top. Still more to the Westward a rather high range with two summits is seen, then a lower range of hills, one of which, having two conical tops, is higher and stands isolated.

Near Sikka the country, over a distance of about 8 miles, is composed of low hills, alternately cultivated or grown with alang-alang. Not far to the East of Sikka, close to the coast, there is a rather high range, which looks like an ancient crater broken down on its Southern side, a cone of ashes still standing erect, the whole however grown with vegetation.

At Sikka anchorage may be found, the lead showing 33 fathoms, sand, shells and coral, at about 500 M. to the East of the reef, the church bearing N.N.W.


N
W
E
S
Batu Luak
Coral reef
dries at low water
R O P A U
O T T I
Coral reef
dries
at low water
MANUOI ANCHORAGE.
PEPELA BAY.
ROTTI ISLAND.
H.M. „SIBOGA". 1900.
Depths in fathoms of 1.8 Metre
1 Scamile
2000 M

This reef projects a cable from the shore. In case of swell landing is difficult here and may best be done in boats of the natives. Off Paga, at about 4 miles to the East-southeast of this village, a distinct discoloring of the water was observed, which seemed to extend in a Northerly direction unto the shore, it being best visible on its outer limit. May be this is the reef shown on the chart which then however extends further to seaward.

Paga village, visible from the offing, is situated further to the Westward than shown on the chart, the distance from Sikka being about 8 miles. West of Paga and close to the coast there is a range of moderate height with indented, rocky summits. Not far to the Westward of the then following landpoint the mountains are intersected by a valley trending North and South. On its East side some huts were seen standing near the shore, and villages more inland on the hills. From this valley a river discharges, showing its discolored water until a distance of 3 to 4 miles from the coast. The mountain range West of this valley shows a steep, brown bluff on its sea-side. The Westernmost hill of this range is a conspicuous, green clump, which, when seen from the Southward, has the shape of a mitre, with a narrow vertical row of darkgreen trees.

To the Westward of this promontory is another valley, less wide than the former; then over a distance of some miles a range of moderate height ending at the base of the volcano, shown on the chart. The summit of this volcano, which was estimated to be more than 2000 M. in height and the slopes of which are well cultivated, is in about: lat. 8° 45′ S. and long. 121° 47′ E.

The extensive reef shown on the chart in long. 122° E. could not be discovered, when steaming along this coast at a distance of 3 to 4 miles. It was presumed that discolored river-water may have caused a mistake, and that the reef does not exist.

South of the volcano just mentioned, another mountain, 1450 M. in height, is situated on the Eastern side of Ipih Bay. It has many sharp and steep ridges ending at the sea-side in nearly perpendicular bluffs. It is in position: lat. 8° 50′ S. and long. 121° 46′.5 E.

The West side of Ipih Bay is formed by a peninsula, on the extremity of which is the still active volcano Gunong Ija, 720 M. in height. Its slopes are covered with black and reddish ashes. Somewhat more than 2 miles North of Gunong Api stands Table Mountain (Gunong Pui), a very conspicuous, ancient crater of a regular conical shape with broad, flat top. It is 440 M. in height and brightly green all over. Pine-apples of excellent quality are cultivated in the basin on the top formed by the ancient crater.

Endeh Island (Nusa Endeh), situated at some distance West of Gunong Ija, is 510 M. in height in its Southern part, the Northern part being 180 M. According to information there is a small cove at its Northern extremity, affording anchorage for vessels of small size.

Tonga Point, 13 miles West of Nusa Endeh, is surmounted by a mountain with a broad top, called Narotangie; it is of moderate height. Another 7 miles further to the West and at a distance of about 4 miles inland is Mount Keo, a very regular volcanic cone, 2000 M. in height. Some 14 miles West of it stands Mount Rokka another ancient volcano, 2420 M. in height. Its shape, if possible, still more resembles that of a mathematical cone, the summit being somewhat sharper than that of Mount Keo.

From Mount Rokka a range extends until near the coast, which in this locality has a broad landpoint called Tandjong Bombang.

To the Westward of the Rokka mountains the coast is considerably lower and trends inward, forming Ai-Mereh Bay. Further Westward, at 12 and 20 miles respectively from Mount Rokka and not far inland, there are two mountains of moderate height, the Easternmost with many indentations, the Westernmost with a broad and round top, this latter being in position: lat. 8° 50'.6 S. and long. 120° 37' E.

On this part of the coast high ranges of mountains are visible at a considerable distance inland.

At largely 40 miles to the Westward of Mount Rokka and about 5 miles from the coast is Toren Island (Pulu Ramuh), which is very conspicuous by a steep and sharp peak, 580 M. in height. The peak is in lat. 8° 54' S. and long. 120° 15'.4 E.

A running survey of the South coast of Flores from Sikka to Toren Island showed only relatively small differences with the existing charts.

100. **Ipih Bay.** Flores, South Coast. 9. II. 1900. (Stat. 307). This bay affords good anchorage in the West monsoon. The bottom however is steep, so that it is recommended to steer for the anchorage with the anchor and 15 fathoms of chain veered down from the bow. The "Siboga" anchored in 14 fathoms, sand, the extremities of the rocky islet in the Northwestpart of the bay bearing 64° and 70°, the Eastern extremity of the peninsula 184° and the Southern extremity of the sand beach 249°.

The Southern limit of the 5-fathoms-bank shown on plan 31 on Dutch chart N° 118, is situated 450 M. more to the Northeast than it is given on that plan, the anchorage accordingly affording much more space than it would be throught therefrom. The 5-fathoms-limit however is only about 50 M. distant from the shore, which is nearer than is shown on the plan. The circular stony border, figuring on this plan, is the base of the low and bare hill in which Gunong Pui ends at its Northeastern side.

When on this anchorage in February 1900, the West monsoon then being very weak, a squall was experienced from Southeast during the night. The wind afterwards blowing from the same quarter until noon caused some sea, by which landing was difficult.

From Ipih Bay a foot-path leads over the isthmus to Endeh village in somewhat more than half an hour.

III.

HEIGHTS OF ISLANDS AND MOUNTAINS IN THE INDIAN ARCHIPELAGO.

A special study was made of observations for determinating the height of mountains and islands, a point as well of geological as of direct nautical importance. In this respect too, the sea-charts and descriptions of the Eastern part of the East Indian Archipelago leave much to be wished for. Yet it needs no arguing that exactly there, where the chart contains still more than one incorrectness in the matter of the exact situation and the figurative representation of the islands, and where the knowledge of tide- and monsoon currents is still far from complete, the want of correct heights of islands etc, will be felt more than ever. If the height above the sea of some top sighted is known, the navigator will find sufficient data for correcting his reckoning in its compassbearing and the altitude above the horizon, measured by sextant.

Apart from those, stated by geologists and explorators, many of the heights mentioned on the charts, are little trustworthy, and part of them are apparently only based on estimates. It is true that many of these heights are doubtless due to the observations and calculations of navigators, who were alive to the importance of these data, but whereas their anglemeasuring may have been sufficiently correct, they could for the distances, required in their calculations, only base themselves on the results of compassbearings, which, exactly on account of the incorrectness of the charts, must have been uncertain or false in many instances.

This drawback can only be removed either by correcting the chart beforehand, independently from the heights of the mountains, or by an elaboration and combination of the observations, using these heights also as data. If — and this will as a rule be the case during the run — there should be little time and choice for the observations to be made, the latter method is to be preferred. It could be applied successfully in many cases. We determined upwards of 200 heights of mountains and islands; they are given in the following table, together with some particulars about geographical positions, etc.

All heights in this table are those of the highest visible points, trees included, in case of vegetation.

If not otherwise mentioned the names in the table indicate islands. Gunong is the Malay word for mountain.

HEIGHTS OF ISLANDS AND MOUNTAINS IN THE INDIAN ARCHIPELAGO, ACCORDING TO OBSERVATIONS BY H. N. M. "SIBOGA", 1899—1900.

Island, mountain, etc.	Height in Metres.	Remarks.
Kangeang Group.		
Kangeang Island.	350	Highest point of island; a small conical top in lat. 6° 53′.5 S. and long. 115° 26′ E.
it.	305	Small conical top in lat. 6° 52′.7 S. and long. 115° 22′.3 E.
Urk (Kemirian) Island.	47	
Little Sunda Islands.		
Bali Peak.	3200	
Penida Island.	600	
Lombok Peak.	3600	
Sumbawa.		
Setonda Island.	312	
Gunong Api, Sangeang Island.	1945	
Mount Tambora.	2725	
Flores.		
Rusah Linguette.	283	Island North of Flores.
Gunong Ija.	720	Endeh Peninsula, South coast of Flores; lat. 8° 52′.7 S. and long. 121° 38′.5 E. Active volcano.
Gunong Pui.	440	Endeh Peninsula; Tafelberg of Dutch chart, a small ancient crater; lat. 8° 50′.7 S. and long. 121° 39′.2 E.
Mountain East of Ipih Bay.	1450	Lat. 8° 49′.7 S. and long. 121° 46′.5 E.
Nusa Endeh, S.-top.	510	Lat. 8° 53′.4 S. and long. 121° 30′.3 E.
it. N.-hill.	180	
Mount Keo.	2000	Lat. 8° 49′.0 S. and long. 121° 10′.3 E.
Mount Rokka.	2420	Lat. 8° 52′.4 S. and long. 120° 55′.8 E.
Top of mountain.	990	Lat. 8° 50′.6 S. and long. 120° 37′.0 E.
Toren Island (Pulu Ramuh).	580	Lat. 8° 54′0 S. and long. 120° 15′.4 E. Sharp peak.
Lomblen.		
Mount Lamararap.	1638	
Mount Lamuiong.	1042	
Southwest point of island.	588	Conical top.
Pulu Soangi.	52	
Mount Lowotolo.	1420	
Adonara.		
Mount Boleng.	1640	Also named Mount Woka on sea charts.
Saleyer and Kalao Group.		
Pulu Passi (Pamatati Island).	94	
Clump of trees on Saleyer Island.	350	Lat. 5° 52′.8 S. and long. 120° 30′.8 E.
Tanah Djampea.	578	
Kalao Tua.	518	
Sukur.	281	
Madu.	120	
Tanah Karompa.	83	

Island, mountain, etc.	Height in Metres.	Remarks.
Islet near Tanah Karompa.	28	
Kaju Wadi.	304	
Badjak.	124	
Bimbee.	140	
Sisir.	31	
Kasuari.	40	
Rusah.	223	
Tambolulang.	196	
Sangir and Talaut Islands.		
Gunong Abu, Great Sangir Island.	1860	Lat. 3° 39′.5 N. and long. 125° 26′.5 E.
Gunong Abu, Siau Island.	1780	
Babundeke.	70	
Sangaluan.	55	
Para.	250	
Mahongetan.	150	
Karakitang.	265	
Kalama.	390	
Lipang.	200	
Kabalusu.	260	
Meares.	115	
Ariaga.	120	
Mindanao Group.		
Balut.	980	
West Coast of Halmaheira.		
Tidore.	1754	
Motir.	1020	
Maitara.	475	
Mareh.	370	
Makjan.	1480	
Kajoa, Northern part.	400	
it. Southern part.	290	
Batjan Group.		
Mount Sibela, Batjan Island.	2200	Highest point of range in about lat. 0° 45′ S, and long. 127° 30′ E.
Zoutberg, Batjan Island.	960	Conical mountain in about lat. 0° 47′ S. and long. 127° 43′ E.
Mandjoli, Southeastern part of island.	390	
Obi Group.		
Tapat.	540	
Bisa, Western part.	465	The Eastern part of the island is lower.
Obi Latu.	700	Conical top in Northeastern part of island.
Obi Major.	1490	Top of range in about lat. 1° 31′ S. and long. 127° 38′ E. East of the meridian of 128° the island is low.
South Coast of Halmaheira.		
Doworra.	330	

Island, mountain, etc.	Height in Metres.	Remarks.
Five Islands.	25 à 30	
Great Geelmuiden.	120	A very regular flat dome-shaped hill, surrounded by a low border of land.
Salomakiëe (Damar).	170	
Hassil, Southern hill.	230	
it. Northern hill.	215	
Range of hills on Halmaheira.	270	The highest part of this range extends from lat. 0° 52′ S. and long. 128° 17′ E. about 3 miles Northwestward.
Hill on Libobo Point.	160	
East Coast of Halmaheira.		
Easternmost islet of Wiedie Group.	55	Is the highest islet of this group.
Vaarwel Island.	50	
Muor Island.	180	
Gebé Island, etc.		
Northwestern part of island.	40	Of nearly equal height throughout.
Northern range of hills.	260	
Southern range of hills.	320	
Conspicuous round top near South point of island.	340	Lat. 0° 12′.0 S. and long. 129° 30′.4 E.
Fou Island.	120	
Ju.	55	Flat.
Gagi.	350	Highest in the Western part of the island.
North and West Coast of Waigeu.		
Ruib (Kawee) Island.	750	Conical top in lat. 0° 3′.5 S. and long. 130° 7′ E.
Uranie.	200	Perpendicular bluffs on Northeastside of island.
Coquille.	180	
Mèh Island.	180	Near Northwest point of Waigeu.
Wunoh Island.	107	
Shaggy Rocks (Seprang).	40	
Knoopen (Loh Loh).	50	
Waigeu, highest point of Western range.	680	In about lat. 0° 8′ S. and long. 130° 23′.5 E.
Highest point of another range.	940	In about lat. 0° 8′ S. and long. 130° 33′ E.
Buffaloes Horn.	1100	A very conspicuous steep top; the position not being accurately known, the height is approximate.
White Rock in Aljui Bay entrance.	30	West coast of Waigeu.
Batang Pali.	370	
Dju Island.	50	
Jef Fam Group.		
Great Fam.	210	In lat. 0° 34′ S. and long. 130° 15′ E. The Northeast side of the top of the island is very steep.
Southwesternmost of Fam Islands.	55	
Batanta.	1120	Highest point of island in about lat. 0° 51′ S, and long. 130° 34′.5 E.
Jef Doif Group.		
Klaarbeek (Mios Pie).	104	

Island, mountain, etc.	Height in Metres.	Remarks.
Kommerrust (Mios Ga).	47	
Schoteroog (Mios Pas).	27	
Vlaming (Mios Gien).	25	
Kofiau.		
Highest hill.	260	In lat. 1° 10′.5 S. and long. 129° 50′.2 E.
Eastern hill.	180	
Western part of Island.	60 à 100	
East Coast of Misool.		
Seven Islands.	65	Highest of rocks.
Daram.	125	
Islet South of Daram.	84	
Highest of False Pisangs.	84	
Highest island East of Southeast point of Misool.	300	Approximate height.
South Coast of Misool.		
Warakaket.	244	
Kaleg.	220	
Billok, Western hill.	87	
it Eastern hill.	64	
Matè.	108	
Southwest Island.	56	Western hill.
Waaf.	127	
Bilula.	243	
Hills West of Lilinta.	400	Approximate height.
Hills near South coast of Misool in 130° 5′ Longitude.	540	it.
Sabuda Group.		
Highest point of Sabuda Island.	172	
Sabuda Island, Western hill.	148	
Tartaruga Rock.	52	
Sentjan Rock.	46	
Highest of Pisangs.	88	
West Coast of New Guinea.		
Batu Putih Island.	140	
Ceram Laut Group.		
Goram.	310	
Manawoka, Northern part.	320	
it. Southern part.	340	
Suruaki.	110	
Ceram Laut.	130	Top of conspicuous tree.
East and North Coast of Ceram.		
Mądurang.	27	Lat. 3° 39′.0 S. and long. 131° 1′.8 E.
Akat.	33	
Parang.	125	

Island, mountain, etc.	Height in Metres.	Remarks.
Mount Selanggor.	775	Lat. 3° 42′.2 S. and long. 130° 46′.6 E.
Mount Suru.	750	Lat. 3° 46′.2 S. and long. 130° 45′.5 E.
Mount Monnikskap.	790	Lat. 3° 46′.4 S. and long. 130° 44′.0 E.
Mount Kil Badir.	300	Lat. 3° 38′.5 S. and long. 130° 43′.0 E. Height and position approximate.
Mount Bati.	500	Lat. 3° 36′.5 S. and long. 130° 49′.0 E. Height and position approximate.
Mountain near North Coast of Ceram.	2100	Lat. 2° 57′.5 S. and long. 129° 40′ E. Height and position approximate.
West Coast of Ceram.		
Bonoa.	600	In about lat. 2° 59′ S. and long. 127° 53′ E.
Kelang, Eastern top.	845	Lat. 3° 13′ S. and long. 127° 46′ E.
Manipa.	516	
Soangi, West of Manipa.	90	
South Coast of Ceram.		
Mountain near South Coast.	3050	In lat. 3° 10′ S. and long. 129° 28′ E. Position and height approximate.
Buru.		
Mount Batu Dua.	1800	Lat. 3° 31′ S. and long. 127° 8′ E.
Sula Besi Group.		
Sula Besi, Southern part.	565	Lat. 2° 21′.5 S. and long. 126° 2′.5 E.
it. Centre of Island.	555	
it. Northern top.	500	Lat. 2° 1′ S. and long. 125° 57′.5 E.
Mangoli.	1040	In about lat. 1° 51′ S. and long. 126° 3′.5 E.
Lisamatula.	245	
Western Part of Banda Sea.		
Kabaëna Peak.	1680	Lat. 5° 18′ S. and long. 121° 56′.3 E.
Kabia (Baars) Island.	37	
Tukang Besi Islands.		
Binongka.	220	Highest somewhat North of centre.
Tomia.	340	Approximate.
Lintea.	60	
Tongowoho.	20	
Lucipara Group.		
Northwestern island.	33	Is the greatest and highest island of this group.
Ambon Group.		
Mount Wawani, Ambon.	907	
Mount Tomoltitu, Ambon.	898	
Haruku.	602	
Saparua, steep Southwest point.	320	
Saparua, Northeast point.	269	
Melano.	116	
Nusa Laut.	358	

Island, mountain, etc.	Height in Metres.	Remarks.
Banda Group.		
Banda Peak.	620	
Banda Lontar (Lontoir).	502	
Papenberg, Banda Neira.	227	
Rozengain.	164	
Run.	188	
Ai.	136	
Sewangi.	100	
Watubela Group.		
Watubela.	210	
Kasiwui.	355	
North Baam.	82	Rocky islet.
South Baam.	68	Rocky islet.
Tiur.	390	Southern top. Highest point of island.
Kurkap.	35	
Uran.	30	
Kur Group.		
Bui.	70	
Kainos.	40	
Kameer.	140	
Kur.	400	
Mangur.	50	
Fadol.	150	
Vonin.	30	
Kei Islands.		
Taam.	140	
Walir.	60	
Tajandu.	80	
Mount Daab, Great Kei.	821	
Mount Morbait, Great Kei.	659	
Sermata Islands.		
Mount Würlali, Dammer Island, Western top.	830	
Eastern top.	810	
North Terbang.	140	
South Terbang.	125	
Two islands Southwest of Dammer Island.	30 and 40	
Teou.	680	
Roma, Northwestern part.	565	Lat. 7° 33′.5 S. and long. 127° 24′.3 E.
it. Southwestern part.	370	Lat. 7° 37′.5 S. and long. 127° 22′.5 E.
it. Mount Djerusu.	580	Lat. 7° 34′.8 S. and long. 127° 27′.1 E.
Nusa Mitan.	52	Lat. 7° 38′.0 S. and long. 127° 25′.8 E.
Mapura.	314	Lat. 7° 33′.3 S. and long. 127° 35′.7 E. Peak.
Peak Island.	197	Lat. 7° 31′.7 S. and long. 127° 32′.8 E.
Kisser.	240	Lat. 8° 3′.0 S. and long. 127° 10′.5 E.
Letti.	428	Lat. 8° 11′.8 S. and long. 127° 41′.3 E.

Island, mountain, etc.	Height in Metres.	Remarks.
Moa, Mount Karbou.	400	Lat. 8° 10′.4 S. and long. 127° 59′.3 E.
it. hill East of Mount Karbou.	256	Lat. 8° 10′.4 S. and long. 128° 0′.8 E.
it. highest point of Western part of island.	300	Lat. 8° 7′.8 S. and long. 127° 51′.0 E.
Moa, hill most to the West.	240	Lat. 8° 7′.4 S. and long. 127° 48′.9 E.
Lakor.	50	
South Coast of Timor.		The names of most of these mountains are unknown.
Steep, barren, rocky top.	939	Lat. 8° 29′.7 S. and long. 127° 11′.6 E.
Steep, rocky top, highest point of lofty range.	2402	Lat. 8° 38′.3 S. and long. 126° 36′.7 E.
Top, name unknown.	1306	Lat. 8° 45′.4 S. and long. 126° 29′.7 E.
Top, name unknown.	1100	Lat. 8° 48′.1 S. and long. 126° 14′.5 E.
Top, name unknown.	1170	Lat. 8° 54′.0 S. and long. 126° 0′.0 E.
Two tops close together, on highest part of broad range:		This mountain seems to be the same as Mount Myrmidon, or at least very near to it.
Southern top.	2620	Lat. 8° 57′.3 S. and long. 125° 35′.3 E.
Northern top.	2500	Lat. 8° 55′.4 S. and long. 125° 36′.6 E.
Hill not far from the coast.	300	Lat. 9° 9′.7 S. and long. 125° 38′.0 E.
Mount Folofait.	1840	Lat. 9° 12′.8 S. and long. 125° 9′.7 E.
Batu Putih.	68	Highest point of white cliff. Lat. 10° 14′.5 S. and long. 124° 5′.4 E.
Rotti.		
Lakemolah Hill.	266	Lat. 10° 41′.3 S. and long. 123° 22′.0 E.
Hill.	230	Lat. 10° 42′.6 S. and long. 123° 18′.9 E.
Flat hill.	234	Lat. 10° 43′.7 S. and long. 123° 16′.8 E.
Mount Ai Lai.	445	Lat. 10° 47′.0 S. and long. 123° 13′.7 E.
Steep rocky bluff.	197	Lat. 10° 48′.5 S. and long. 123° 9′.0 E.
Top of flat hill.	228	Lat. 10° 50′.0 S. and long. 123° 5′.3 E.
Hill.	106	Lat. 10° 50′.8 S. and long. 123° 5′.6 E.

IV.

DEPTHS OF THE SEAS IN THE INDIAN ARCHIPELAGO.

This work contains the following charts of depths:

Chart I, on scale 1 : 3.000.000, representing the Eastern part of the Archipelago, from Lat. 7° 0′ N. to 12° 0′ S., and from Long. 112° 0′ to 135° 0′ E.

Chart II, on scale 1 : 5.000.000, comprising the whole Indian Archipelago, from Lat. 8° 0′ N. to 12° 0′ S., and from Long. 95° 0′ to 135° 0′ E.

Chart III, on scale 1 : 1.000.000, giving the more detailed figuration of: the Southern part of the Sulu Archipelago, Manipa Strait, the Kei Islands, Lombok Strait, and the Postillon and Paternoster Groups.

For the construction of these charts the following sources and data have been made use of:

The Dutch charts of the East Indian Archipelago, issued by the Dutch Hydrographic Office at the Hague.

The English Admiralty Charts 941 A and B, 942 A and B, 2660 A and B, 928, 2575 and 2576.

O. KRÜMMEL. Das Relief des Austral-asiatischen Mittelmeers. Zeitschrift für Wissenschaftliche Geographie, 1882.

R. SCHUILING, Dieptekaart der Zeeën van den O.-I. Archipel. Tijdschr. Kon. Ned. Aardrijkskdg. Genootschap, d. V 1888.

BERGHAUS, physikalischer Handatlas. 1892.

PETERMANN's Mittheilungen, 1881. Taf. 6.

Annalen der Hydrographie, 1884 (Soundings U. S. S. S. "Enterprise"), and 1891 (Soundings Br. S. S. "Rambler", "Egeria" and "Recorder").

Narrative of the Cruise of H. Br. M. S.S. "Challenger", 1873—1876.

Forschungsreise S. M. S. "Gazelle", 1874—1876.

Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia", 1898—1899, Band I.

The soundings and surveys by the scientific expedition on board H. N. M. S.S. "Siboga", 1899—1900, and those, obtained by H. N. M. surveying S.S. "Banda" 1900—1901. The soundings of both these vessels are given in Appendix II.

In the construction of Chart I it was not possible to write down all the soundings, figuring in the charts or obtained by the ships, named above. Those of the "Siboga" however are all inserted with a few exceptions; they are written in erect cyphers.

The soundings by the "Banda", obtained with a view to cable-laying, could only partially be inserted as they follow each other closely. In the drawing of the limits of depths however the non-inserted depths have also been taken in account, the construction, if necessary, having first been done on a larger scale.

The depths, which at present figure on this chart, have been chosen in such a manner, that the average depth of some area might be known as accurately as possible from it, as well as the greatest and the smallest depth in those localities, where the knowledge of such might be interesting. Moreover as a rule such depths have been inserted as may enable of judging of the probable exactness of the limits of depths, as represented on the chart. It is obvious, that for the present the data are not yet sufficient to warrant certainty on this point everywhere, for which reason in many instances probability and analogy came instead of certainty.

As regards the slope of the sea-bottom attention is drawn to the fact, that, for the sake of clearness, in some places the lines of depths have been drawn somewhat further apart than they really should have been.

Similar observations refer to Chart II and III, the Eastern part of the first being a reduced copy of Chart I, the number of depths however being somewhat less.

The existing indications of the nature of the bottom for the relatively small depths of

the China Sea and Java Sea being of little scientific value, these indications have been omitted in these waters on Chart II for the sake of clearness. For this same reason they have also been omitted in the Eastern part of this chart, Chart I being available for that purpose, East of Longitude 112°.

Many of the original publications not being at hand before the charts went to press, number of depths had to be taken from the sea charts. On account of this a difference of a single Metre with the original data may occasionally be found in some of the depths, which differences then are due to the reducing back into Metres of the soundings, which were expressed in fathoms on those charts.

It may be mentioned here, that with a few exceptions the depths, stated by the "Siboga" in those localities, the depths of which were given by the charts, did never show a greater difference than may safely be attributed to differences in position or to really existing slopes of the sea-bottom. In two cases only, which have already been referred to by Prof. WEBER in the "Introduction" (Monograph I) of this work, the differences were too great to be attributed to these causes.

The first case refers to the soundings of 55 to 120 fathoms in the „Molucca Sea" by the German sailing vessel "Karl", reported in the "Annalen der Hydrography und Maritimen Meteorologie", 1885. These soundings have figured in the Netherland Indian Sea charts, but are now cancelled from them. The bottom specimen being mentioned at each of these soundings there seemed to be no reason to doubt of the existence of an extensive plateau or ridge in this part of the Banda Sea. The line of the said soundings however was crossed by us on Sept. 18 of 1899 with the result, that at four trial soundings (Stat. 202[a, b, c and d]) the bottom was not reached at 500 M. (278 fathoms). Supposing however, that the "Karl" might have been wrong in her Longitude, another sounding was tried in lat. 3° 32′.5 S. and long. 124° 15′.5 E. (Stat. 203), which position is only 12 miles N. by W. from a sounding of 60 fathoms of the "Karl". The 4892 M. of wire, which at the time were on the sounding machine, proved to be too short at this sounding, the bottom not being reached.

The second case refers to the depth of 4000 fathoms (7200 M.), figuring on the charts in lat. 4° 19′ S. and long. 129° 20′ E. (see pag. 44), the controlling of which was one of the points of our working scheme. On Nov. 22 of 1899 a sounding in 4° 19′.5 S. and 129° 20′.8 E. (Stat. 238) showed 4428 M., i. e. 2460 fathoms. Considering the fact, that a depth of 4446 M. was found 8 miles North, and a depth of 4237 M. 10 miles South of that position, and that much smaller depths exist not far to the West (Siboga Ridge) and to the East (Banda Plateau), the existence of a depth of 7200 M. in this neighborhood may be considered as most improbable. No doubt this sounding effected long ago with a hemp rope, by navigators who were not accustomed to this work, can not be trusted upon.

With regard to the names, used in the charts, it will be seen that those of the Dutch and English sea charts have been adopted with only a few exceptions and with some changes in the spelling.

The number of names having been restricted for the sake of clearness, no new

names have been added, except that of "Siboga Ridge" in the Banda Sea, and that of "Bali Sea" for the area included between the Kangeang and Paternoster groups and Bali and Lombok.

The name "Molucca Sea", which appears in the Dutch and in the English charts in a different way, has been omitted, because of the argument that this name, if it were used at all, ought to be given to something like the whole area, comprised between Celebes and the meridian of 132° Eastern longitude, and the parallels of 2° N. and 8° S.

In accordance with the English charts the name "Molucca Passage" was given to the passage between Celebes and the Halmaheira Group, this passage being the largest of those, by which the inner part of the Molucca Sea, as meant here above, communicates with the Pacific Ocean, it being moreover especially entitled to this name, on account of the situation of the Ternate and Tidore group, which of all times has been considered to be one of the more important Molucca groups.

For reasons of nautical interest the name "Djilolo Passage" of the English charts has also been preserved.

The names "Flores Sea", "Savu Sea", and "Timor Sea" have been used in accordance with the Dutch charts. In English charts the name "Flores Sea" is given to the area East of the Tiger Islands, between the East end of Flores and the Tukang Besi group, which nomination however was thought to be insuitable for nautical as well as for oceanographic purposes.

In some other works these waters have been named "Sunda Sea"[1]), but this name was thought still more objectionable. It might be used as a general denomination of the whole surface, fronting both the Great and Little Sunda Islands, but not as a name for that extreme part of this surface only, which indeed is farthest from the more important of the Sunda Islands.

This area has been considered to form the Western part of the Banda Sea. For nautical purposes the name "Buton Sea" might be given to it, the Sultanate of Buton, from a political and social point of view being the most important of the adjacent native powers.

For similar reasons the name "Sula Sea" might be given to the Northwestern part of the Banda Sea (Molucca Sea of the English charts), which name might also suit oceanographic purposes, if it were proved afterwards, that the outer arc of the Banda Sea formation is not interrupted on its Northwestern side, but that a submarine ridge exists between Buru and the Tukang Besi group.

As for the present neither the soundings of the "Siboga" nor those of the "Bali" exclude the possible existence of such a ridge.

In the list of soundings (Appendix II) the name "Obi Strait" is used for the passage between Obi and the Sula Islands.

The name "Halmaheira Sea" has been limited to the basin with depths over 2000 M., South of Gebé Island.

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1) F. i. STIELER's Handatlas. Gotha, Justhus Perthes. BERGHAUS. Physikalischer Atlas. 1892. Karte N°. 25. DR. J. P. VAN DER STOK "Wind, weather, etc. in the East Indian Archipelago".

The exigences of names being different, according to their purposes being nautical or oceanographic, it is proposed to introduce the following names for the latter purpose only:

"Spermonde Depression" for the Southern part of Makassar Strait, with depths over 2000 M., between Spermonde and Borneo Bank;

"Sodjolo Depression" for the Northern part of Makassar Strait, with depths over 2400 M., which communicate with the Celebes Sea by a narrow depression of a depth of over 3000 M. The name is derived from the conspicuous conical mountain Sodjolo, which is one of the highest tops of the Ogoama Range, situated on the narrow part of Celebes, some forty miles North of the equator.

"Saleyer Depression" for that close to the East coast of Saleyer Island, with depths over 3000 M.

"Sangir Depression" for the area between the Sangir and Talaut groups, with a depth over 3000 M.

"Molucca Depression" for the sinking of the earth's crust, stated by numerous soundings over 3000 and 4000 M., to the West of the Ternate, Batjan and Obi groups.

"Arafura Depression" for the depth over 2500 M. in the Northern part of the Arafura Sea between the Kei Islands and New Guinea.

"Kei Depression" for the small area with depths over 3000 M. between the Kei and Aru groups.

As to the name "Weber Deep", which was first used by Sir JOHN MURRAY in an enumeration of the existing "Deeps" [1]), it should be remembered, according to what has been stated above, that the depth of 4000 fathoms, which formerly appeared on the charts, ought to be cancelled, so that this name may only be given to the Easternmost part of the Banda Sea, where a depth of 5684 M. i. e. over 3000 fathoms was recorded by Prof. MAX WEBER with the S.S. "Siboga", another depth exceeding 3000 fathoms having been stated before in that area somewhat more to the Southward.

The names "Mentawei Basin" for the area with more than 1600 M. of depth between Sumatra and the Mentawei Islands, and "Mentawei Deep" for the typical sinking of the bottom on the oceanic side of the islands fronting the Southwest coast of Sumatra, with its depths over 5000 M., have already been introduced by the "Valdivia"-Expedition [2]).

DATA CONCERNING THE VOYAGE.

In Appendix III some data concerning the voyage of the "Siboga" are given, which might perhaps be considered to be of some value for those, interested in this expedition only.

It was thought however that they may also be of interest for those who, in future, will have to prepare expeditions of a similar nature, especially with regard to the costs of coals and to the work, which may be done with a relatively small personal.

1) "Nature", 1899. pag. 523.

2) Dr. G. SCHOTT. Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia", 1898—1899. I. 1902

APPENDIX I.

GEOGRAPHICAL POSITIONS IN THE EASTERN PART OF THE INDIAN ARCHIPELAGO, ACCORDING TO OBSERVATIONS BY THE OFFICERS OF THE "SIBOGA" ON HER SCIENTIFIC CRUISE 1899—1900.

This list only contains the positions of the observation spots, the latitudes and (or) longitudes of which have been accurately determined by astronomical observations or directly reduced from these. Some of these positions have served as a base for the running surveys. An account of a great number of positions of mountains etc. resulting from these surveys will be found in Chapter III of this work.

Date.	Locality.	Latitude.	Longitude.	Situation of observation spot etc.
1899:		° ′	° ′	
March, 16	Saubi Island, South Coast of Kangeang Island.	6 59,2 S.	115 24,9 E.	West point of village, not far from West point of Saubi Island. Position reduced from anchorage. Suns altitudes on board A. M. and P. M. (See pag. 9).
April, 21	Nangamessi, North Coast of Sumba Island.	9° 38′ 5″ S.	120° 14′ 18″ E.	Northern white pyramid (leading mark). The latitude was found by 3 equal stars altitudes in artificial horizon, with fixed alhidade, according to the method of Gauss; the longitude by suns and stars altitudes in artificial horizon. (See pag. 15).
July, 23.	Kawio, Karkaralong group, Sangir Islands.	4 40 30 N.	125 25 37 E.	East side of extreme South point of Island, the East point of Marore (Ariaga)-Island being just visible. Longitude by suns altitudes in artificial horizon. Latitude taken from chart. (See pag. 21 and Pl. IV).

Date.	Locality.	Latitude.	Longitude.	Situation of observation spot, etc.
		° ′ ″	° ′ ″	
Aug., 6	Laiwui, Northwestpoint of Obi Major.	1 20 3 S.	127 37 48 E.	House close to pier. Suns altitudes in artif. horizon A. M. and P. M. (See pag. 24).
Aug., 7	North coast of Salomakiëe or Damar Island.	0 57 48 S.	129 19 33 E.	South end of sandy beach. Suns altitudes in artif. horizon on shore and stars altitudes on board. (See pag. 25 and Pl. VI).
Aug., 13	Wunoh Bay, North coast of Waigeu Island.	0° 5′.4 S.	130° 19′,2 E.	Ships anchorage. Suns and stars altitudes on board. (See pag. 27 and Pl. VII).
„ „	Saripa (Piapis) Bay.	0 5 .1 S.	130 21 .6 E.	Anchorage West of Hill Island. Reduced from preceding point. (See pag. 28).
Aug., 16	Jef Fam Besar.	0 32 .9 S.	130 14 .6 E.	Anchorage near North point of island. Suns and stars altitudes on board. (See pag. 29).
	„ „ „	0 34 .0 S.	130 15 .2 E.	Top of Island; reduced from preceding point. (See pag. 29).
„ „	Kofiau Island.	1 9 .7 S.	129 47 .8 E.	Anchorage on North coast. Suns and stars altitudes on board. (See pag. 31).
	„ „	1 10 .5 S.	129 50 .0 E.	Top of highest hill; reduced from preceding point. (See pag. 31).
Aug., 19	Selee (Galewo) Strait, West coast of New-Guinea.	1 25 .0 S.	130 57 .0 E.	Ships anchorage near Seget. Suns and stars altitudes on board. (See pag. 31 and Pl. VIII).
Aug., 20	Daram Island.	2 8 .8 S.	130 52 .9 E.	Ships anchorage on Northeast coast of island. Suns, moons and stars altitudes on board. (See pag. 32 and Pl. IX).
Aug., 22	Sabuda Island.	2 38 .4 S.	131 34 .7 E.	Ships anchorage on North coast of island. Stars altitudes on board. (See pag. 34).
Aug., 24	Atjatuning, West coast of New-Guinea.	2° 56′ 38″ S.	132° 8′ 5″ E.	Near South point of small cove. Suns altitudes A. M. and P. M. in artif. horizon. (See pag. 35 and Pl. X).
Aug., 31	Lilintah, South coast of Misool Island.	2° 4′.3 S.	130° 14′.2 E.	Ships anchorage near small islets West of village. Suns altitudes A. M., meridional and P. M., on board. (See pag. 33).

Date.	Locality.	Latitude.	Longitude.	Situation of observation spot, etc.
		° ′	° ′	
Sept., 14	Sanana, Sula Besi Island.	2 3.0 S.	125 58.4 E.	Flagstaff. Longitude by suns altitudes A.M. and P.M. in artif. horizon. Latitude taken from chart. (See pag. 39).
		° ′ ″	° ′ ″	
Nov., 2	West coast of Binongka Island, Tukang Besi Islands.	5 57 25 S.	123 58 46 E.	First small sandy beach on the North side of the larger sandy shore in the Bight of Pasir Pandjang. Suns altitudes and circummeridian altitudes of stars in artif. horizon. (See pag. 41 and Pl. XI).
Nov., 9	Lucipara Islands, Banda Sea.	5 30 40 S.	127 33 22 E.	South point of Southern islet. Suns altitudes and circummeridian altitudes of stars in artif. horizon. (See pag. 42 and Pl. XII).
Dec., 5	Tiur Island.	4 41 47 S.	131 43 5 E.	Extreme North point of island; first point West of Rumah Lusi village. Suns and stars altitudes in artif. horizon. (See pag. 44).
Dec., 7	Kur Island.	5 20 51 S.	131 57 0 E.	On the shore near the inlet in the coral reef South of Kilsuin village. Suns and stars altitudes in artif. horizon. (See pag. 44).
1900.				
Jan., 12	Rumah Kuda Bay, Roma Island.	7 36 6 S.	127 24 39 E.	On the shore near mouth of small river. Suns altitudes in artif. horizon A.M. and P.M. (See pag. 47 und Pl. XV).
Jan., 16	Nusa Besi, East coast of Timor.	8 25 20 S.	127 18 52 E.	On sandy point on Northwest side of island. Suns altitudes in artif. horizon A.M. and P.M. (See pag. 49—51 and Pl. XVI).
		° ′	° ′	
Jan., 18	South coast of Timor (See Pl. XVI).	8 39.1 S.	127 4.4 E.	Ships anchorage (II), 2 cables from the shore. By compass bearings and heights of mountains. (See pag. 50 and 52).
Jan., 19	„ „	8 54.3 S.	126 31.8 E.	Ships anchorage (III), 6 cables from the shore. Suns and stars altitudes on board. (See pag. 50 and 52).
Jan., 21	„ „	9 9.5 S.	125 48.3 E.	Ships anchorage (IV), 5 cables from the shore. Suns and stars altitudes on board (See pag. 50 and 53).

Date.	Locality.	Latitude.	Longitude.	Situation of observation spot, etc.
		° ′	° ′	
Jan., 22	South coast of Timor. (See Pl. XVI).	9 29 .7 S.	125 4 .2 E.	Ships anchorage (V) 8 cables from the shore, not far South of the fronteer between the Dutch and Portuguese territories. Suns and stars altitudes on board. (See pag. 50 and 53).
Jan., 23	„ „	10 12 .7 S.	124 18 .4 E.	Ships anchorage (VI) 3 to 4 miles from the shore. Suns and stars altitudes on board. (See pag. 50 and 54).
Jan., 24/26	„ „	10 14 .0 S.	124 5 .5 E.	Anchorage (VII) near Batu Putih, Noimini Bay, 3 cables from the shore. Suns and stars altitudes on board. (See pag. 50 and 54).
„	Batu Putih, Noimini Bay, South coast of Timor.	10 14 .5 S.	124 5 .4 E.	Highest point of white cliff. Reduced from preceding point. (See pag. 50 and 54 and Pl. XVII).
		° ′ ″	° ′ ″	
Jan., 28	Cyrus Bay, South coast of Rotti Island.	10 51 58 S.	123 1 30 E.	Rocky point East of Panteih Loku, North side of bay. Suns and stars altitudes in artif. horizon. (See pag. 55 and Pl. XVIII and XIX).
		° ′	° ′	
Febr., 2	Pepela Bay, East coast of Rotti Island.	10 38 .0 S.	123 25 .2 E.	Ships anchorage. Suns and stars altitudes on board. (See pag. 55 and 56 and Pl. XVIII and XX).
Febr., 8	Lamakera, Solor Island.	8 25 .5 S.	123 11 .0 E.	Ships anchorage at Lamakera. Longitude by suns altitudes on board. Latitude taken from chart. (See pag. 17 and Pl. II).
Febr., 9	Sikka Besar, South coast of Flores.	8 43 .0 S.	122 13 .1 E.	At anchorage, Church bearing N 333° E., 4 cables distant. Longitude by suns altitudes on board. Latitude taken from chart. (See pag. 56).

APPENDIX II.

SOUNDINGS BY H. N. M. S.S. "SIBOGA" ON HER SCIENTIFIC CRUISE IN THE EAST INDIAN ARCHIPELAGO.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
Bali Sea [1].			
° ′	° ′		
7 46.0 S.	114 30.5	330	Mud.
7 44.5 S.	114 29.0	291	Mud.
7 54.0 S.	114 48.8	720	Fine, grey mud.
7 44.6 S.	114 44.6	353	Soft fine grey mud.
7 25.0 S.	115 5.0	600	Fine, grey mud.
7 16.0 S.	115 12.5	234(*a*)	Coarse sand and broken shells.
7 15.0 S.	115 15.6	289	Mud and broken shells.
7 17.6 S.	115 16.8	402	Mud.
7 12.8 S.	115 14.3	155	Coarse sand and broken shells.
7 9.5 S.	115 16.2	128	Coarse sand and broken shells.
7 6.6 S.	115 18.0	108	Coarse sand and broken shells.
7 7.0 S.	115 19.4	115	Coarse sand and broken shells.
7 7.2 S.	115 12.5	101	Coral.
7 5.5 S.	115 13.8	91	Mud. (?)
7 4.5 S.	115 12.2	79	Coral.
7 2.6 S.	115 23.6	100	Fine coralsand.
7 3.6 S.	115 24.0	110(*b*)	Grey sand.
7 28.5 S.	115 28.0	1060	Fine, grey mud.
7 28.2 S.	115 24.6	1018	Fine, grey mud.
7 19.4 S.	116 49.5	538	Fine, dark brown sandy mud.
8 0.3 S.	116 59.0	1310	Fine, grey mud, with dark reddish brown stripes.
Lombok Strait.			
8 45.8 S.	115 46.6	210	Hard; probably stone.
8 46.8 S.	115 44.1	193	Hard; small stones and coral.
8 47.7 S.	115 41.2	220	Not obtained.
8 48.5 S.	115 40.0	165	Hard; coral.
8 47.5 S.	115 39.5	310	Stone.
8 48.7 S.	115 39.5	312	Hard.
8 48.9 S.	115 38.0	118	Hard.
8 35.1 S.	115 31.2	305	Black sand.
8 43.5 S.	115 21.5	210	Coarse sand, small pieces of coral.
8 43.7 S.	115 19.5	143	Hard; coral.
8 42.7 S.	115 23.5	178	Hard; coral and stone.

1) The 12 soundings from (*a*) to (*b*) are in the vicinity of Kangeang Island; their positions are based upon that of Urk Island (Kemirian), the centre of this island being in Lat. 7° 4′.7 S. and Long. 115° 11′.5 E.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
Indian Ocean.			
° ′	° ′		
9 2.0 S.	115 47.0	842	Hard; sand.
Flores Sea.			
7 38.0 S.	117 31.0	640	Hard.
7 35.4 S.	117 28.6	521	Coral.
7 31.2 S.	117 42.0	667	—
7 26.0 S.	117 49.6	121	—
7 25.0 S.	117 50.5	96	Sand (?).
7 23.7 S.	117 52.6	313	Coral.
7 20.7 S.	117 58.3	571	Coral.
7 15.5 S.	118 12.3	66	Sand.
7 17.4 S.	118 14.0	32	Coral sand and coral.
7 18.2 S.	118 13.6	883	Soft grey mud.
7 19.8 S.	118 14.5	868	Mud.
7 24.0 S.	118 15.2	794	Fine, grey mud with some radiolariae and diatomys.
7 36.5 S.	118 15.5	450	—
7 52.2 S.	118 34.8	3100	Fine, grey mud.
8 0.5 S.	118 34.7	1600	Mud.
8 4.7 S.	118 44.3	2060	Fine, grey mud, partially green.
6 19.5 S.	119 52.0	1091	Fine, grey mud.
5 54.5 S.	120 19.2	462	Fine, grey and green mud.
7 57.3 S.	122 9.0	2570	Fine, grey mud.
7 37.2 S.	122 3.5	2560	Fine, grey mud.
Saleh Bay.			
8 19.0 S.	117 41.0	274	Fine, sandy mud.
Sapeh Strait.			
8 20.5 S.	119 4.5	369	Coral and shells.
8 23.5 S.	119 4.6	69	Coral and shells.
Makassar Strait.			
4 22.1 S.	118 16.9	2029	Fine, grey mud. (Globigerinae).
0 40.5 S.	188 26.6	2400	Fine, grey mud.
0 40.5 S.	119 4.0	1624	Fine, grey mud.
0 36.5 S.	119 29.5	724	Fine, grey mud.
0 32.0 S.	119 39.8	655	Fine, grey mud.
0 34.6 N.	119 8.5	1301	Fine, grey and yellow mud.
Celebes Sea.			
1 17.5 N.	118 53.0	281	Coral sand and stones.
3 7.0 N.	119 22.0	3975	Bluish mud.
3 19.0 N.	122 2.0	4902	—
3 1.0 N.	122 2.0	600	—
1 37.0 N.	122 37.0	600	—
1 38.0 N.	124 28.2	900	—
1 33.5 N.	124 41.0	1901	Stony.
1 33.7 N.	124 46.5	368	Stone.
3 27.1 N.	125 18.7	2053	Hard.
4 27.0 N.	125 25.7	1645	Globigerina ooze.
5 0.0 N.	125 26.5	1638	Hard shell-bottom.
Sulu Sea and Archipelago.			
5 43.5 N.	119 40.0	522	Stony bottom.
5 48.7 N.	119 49.6	564	Coarse coralsand.
6 9.0 N.	120 21.0	350	Sand.
6 15.0 N.	120 21.0	1270	Fine, grey mud. (Globigerinae).
6 4.1 N.	120 44.0	535	Fine, yellow sand.
6 8.0 N.	121 19.0	275	Coral.
Sangir Deep.			
5 56.7 N.	126 25.0	3302	Fine, grey and bluish mud.
Molucca Passage, West and South Coast of Halmaheira.			
2 50.5 N.	126 53.7	2291	Fine, brown mud.
0 23.8 N.	127 29.0	472	Fine, dark muddy sand.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
° ′	° ′		
0 11.0 S.	127 25.0	397	Mud, stones and coral.
1 0.4 S.	127 25.3	1950	Fine, hard sand.
1 4.5 S.	127 52.6	1454	Fine, grey mud.
Halmaheira Sea and Surroundings.			
0 54.0 S.	128 39.9	827	Hard. Pumice.
0 36.0 S.	128 32.7	512	Coral sand.
0 22.7 S.	128 52.7	2039	Fine, bluish mud.
0 17.6 S.	129 14.5	1855	Fine, grey and green mud.
0 6.0 N.	129 7.2	1089	Yellow, grey mud and sand. Stones.
0 12.6 S.	129 48.0	845	Fine, grey mud.
0 3.8 N.	130 24.3	141	Sand and dead shells.
0 7.2 N.	130 25.5	83	Grey muddy sand, shells. Lithothamnion.
0 7.1 N.	130 26.2	58	Sand, mud and shells.
0 29.2 S.	130 5.3	469	Sand and shells.
0 43.5 S.	129 56.5	391	Coral.
0 46.3 S.	129 54.2	79	Not obtained.
0 47.4 S.	129 52.4	52	Item.
0 49.9 S.	129 50.0	27	Item.
0 59.1 S.	129 48.8	411	Coarse sand.
1 10.5 S.	130 9.0	798	Muddy sand.
Ceram Sea.			
2 55.5 S.	126 4.5	2000	—
2 49.4 S.	126 17.0	4113	Bluish, green mud.
2 19.0 S.	126 23.5	4082	Fine, bluish green mud.
2 8.7 S.	126 10.4	2694	Bluish green mud.
2 6.3 S.	126 5.5	1020	Fine sand.
2 48.3 S.	127 13.0	2124	Fine, grey mud.
2 40.0 S.	128 37.5	835	Blue mud.
2 24.5 S.	129 38.5	1633	Dead coral and stones.
2 37.7 S.	130 33.4	1914	Fine, grey and green mud.
3 27.0 S.	131 0.5	567	Fine, yellowish grey mud.
3 46.3 S.	131 9.3	470	Fine, grey mud.
3 37.7 S.	131 26.4	924	Fine, grey mud.
2 28.5 S.	131 3.3	118	Hard sand.
2 35.5 S.	131 26.2	95	No bottom proof.
Obi Strait.			
1 53.5 S.	126 39.0	1504	Stone.
1 55.0 S.	126 50.7	1476	Stone.
1 52.8 S.	127 6.0	2001	Stone.
1 54.3 S.	127 8.3	680	No bottom proof.
Arafura Sea.			
5 46.7 S.	134 0.0	1788	Bluish green mud.
5 47.0 S.	133 39.0	3565	Fine, bluish green mud.
5 49.2 S.	133 21.7	2731	Bluish green mud.
5 53.0 S.	132 56.3	630	Yellowish grey mud with sand.
5 54.0 S.	132 56.7	984	Brown mud.
5 56.5 S.	132 47.7	595	Grey mud, coral and stones.
5 53.8 S.	132 48.8	560	Brown and grey mud.
6 3.8 S.	132 52.8	3026	Fine, bluish green mud.
6 8.3 S.	132 57.8	2655	Fine, bluish green mud.
5 29.2 S.	132 52.5	487	Coral sand and dead coral.
5 26.6 S.	132 32.5	397	Greyish green mud.
5 40.0 S.	132 26.0	310	Fine, grey mud.
5 48.2 S.	132 13.0	304	Hard, grey clay.
5 28.5 S.	132 0.5	238	Not obtained.
5 28.4 S.	132 0.2	204	Hard coral sand.
4 56.1 S.	131 58.4	192	Hard.
Manipa Strait.			
3 46.0 S.	127 42.0	3702	Bluish grey mud.
3 29.0 S.	127 33.0	1820	—
3 20.0 S.	127 22.9	1536	—

Position. Latitude.	Position. Longitude East.	Depth in M.	Bottom.
° ′	° ′		
3 12.8 S.	127 26.0	1195	Hard (Rock?)
3 10.5 S.	127 20.5	940	Rock.
3 13.0 S.	127 13.8	1067	Gravel and sand.
Banda Sea: Eastern, Northern and Central Part [1]).			
4 41.6 S.	131 19.0	4239	Fine, brown and bluish grey mud.
4 38.0 S.	130 42.0	5684	Fine, brown and greyish green mud.
4 16 5.S.	130 15.8	4956	Bluish green mud.
4 25.7 S.	130 3.7	2991	Bluish green mud.
4 24.3 S.	129 49.3	1570	Dark sand and stones.
4 30.2 S.	129 25.0	1000	—
4 30.0 S.	129 20.0	4237	Bluish green and brown mud.
4 19.5 S.	129 20.8	4428	Greenish grey and brown mud.
4 12.0 S.	129 20.4	4446	Same as above.
4 2.0 S.	129 20.3	4507	Dark grey mud.
3 45.2 S.	129 20.2	3685	Fine, dark grey and green mud.
3 42.0 S.	129 2.9	1910	Brown and grey mud.
3 56.0 S.	128 25.5	4489	Fine, bluish green mud.
3 58.0 S.	128 20.0	2000	—
4 23.0 S.	128 45.5	1980	Brown and grey mud with sand.
4 32.5 S.	128 30.5	2527	Brown and grey mud.
4 50.5 S.	127 59.0	2081	Brown and grey mud with sand.
4 52.5 S.	128 37.0	4914	Brown and bluish grey mud.
5 26.3 S.	127 38.5	1595	Hard. (*a*)
5 34.4 S.	127 33.9	1092	Coral sand.
5 34.0 S.	127 31.6	828	Stone.
5 32.1 S.	127 33.0	646	Stone.
5 31.7 S.	127 33.1	421	Coral and stone.
5 31.5 S.	127 32.6	510	Stones and shells.
5 30.3 S.	127 30.2	894	Coral and shells.
5 31.5 S.	127 30.2	1047	Coral sand.
5 30.0 S.	127 27.0	1702	Coral sand and mud.
5 29.4 S.	127 24.6	1811	Hard. (*b*)
5 34.0 S.	127 4.0	2952	Brown and bluish grey mud.
5 44.7 S.	126 27.3	4391	Brown, black and bluish grey mud.
6 10.0 S.	125 35.5	3215	Brown and bluish grey mud.
6 47.5 S.	128 40.5	750	—
7 24.9 S.	128 2.3	3518	Hard.
Banda Sea: Northwestern part.			
3 3.9 S.	125 59.0	2693	Green mud.
3 15.0 S.	125 43.8	3088	Grey and green mud.
3 18.0 S.	125 18.0	500	—
3 19.0 S,	125 9.5	500	—
3 19.0 S.	125 4.5	500	—
3 14.2 S.	124 59.0	500	—
3 32.5 S.	124 15.5	4892	—
Banda Sea: Western part.			
6 24.0 S.	124 39.0	2798	Brown and bluish grey mud and foraminiferae.
6 2.0 S.	123 57.7	1573	Grey mud.
6 24.2 S.	123 39.1	3912	Brown and bluish grey mud.
6 40.6 S.	123 14.7	2477	Brown, grey and green mud.
6 49.0 S.	122 43.0	2190	Same as above.
6 30.0 S.	121 55.0	2796	Same as above.
5 39.0 S.	122 12.0	1886	Solid green mud.
5 7.5 S.	122 39.0	148	Grey mud.
5 28.0 S.	121 23.5	2218	Brown and grey mud.
5 40.7 S.	120 45.5	1158	Same as above.

1) The ten soundings from (*a*) to (*b*) are in the vicinity of the Lucipara Islands; their positions are based upon that of the South point of the Southernmost island, being in: Lat. 5°30′40″ S. and Long. 127°33′22″ E.

In the Southern part of Ambon Bay a sounding of 634 M., coral sand and shells (N°. 232 of the List of Stations) was taken, bearing: Nusaniwi Point 105°, Batu Kapal Point 79°, landpoint near Haturu 42°, Alang Point 267°.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
° ′	° ′		
5 35 .2 S.	120 42 .1	1196	Fine, grey mud.
6 1 .5 S.	120 45 .5	3110	Globigerina ooze.
6 26 .1 S.	120 41 .0	1627	Foraminif. ooze.
7 0 .0 S.	120 34 .5	510	Pale grey mud.
Timor Sea.			
8 17 .4 S.	127 30 .7	1224	Black manganese nodules.
8 20 .6 S.	127 25 .9	890	Not obtained.
8 37 .3 S.	127 18 .6	487	Hard.
8 43 .1 S.	127 16 .7	828	Grey mud.
8 50 .2 S.	127 2 .2	883	Mud.
8 55 .2 S.	126 35 .5	216	Fine, grey mud.
9 0 .5 S.	126 31 .2	869	Hard.
9 0 .1 S.	126 25 .6	100	Fine, grey mud.
9 0 .3 S.	126 24 .5	112	Mud, sand and shells.
9 2 .0 S.	126 22 .6	146	Not obtained.
9 12 .3 S.	125 56 .3	816	Not obtained.
9 10 .3 S.	125 55 .1	421	Fine, grey mud.
9 11 .7 S.	125 47 .3	709	Fine mud.
9 19 .7 S.	125 18 .2	137	Not obtained.
9 26 .7 S.	125 7 .6	32	Mud.
9 38 .0 S.	125 1 .5	95	Mud.
9 39 .0 S.	125 1 .0	94	Mud.
9 51 .0 S.	124 50 .0	146	—
10 3 .9 S.	124 35 .7	164	—
10 10 .5 S.	124 30 .0	97	Not obtained.
10 12 .2 S.	124 27 .3	73	Mud with fine sand.
10 13 .3 S.	124 24 .0	45	Mud.
10 13 .0 S.	124 22 .0	31	Mud.
10 35 .6 S.	124 11 .7.	2050	Brown and grey mud.
10 39 .0 S.	123 40 .0	520	Brown and grey mud.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
° ′	° ′		
10 48 .6 S.	123 23 .1	918	Fine, grey mud.
10 50 .5 S.	123 16 .0	230	Hard.
10 27 .9 S.	123 28 .7	216	Sand.
Samau Strait.			
10 22 .7 S.	123 16 .5	390	Coral sand and stones.
Savu Sea.			
9 3 .4 S.	119 56 .7	959	Globigerina ooze.
10 21 .0 S.	121 1 .8	779	Fine grey mud and sand.
10 24 .8 S.	121 11 .5	1456	Fine, grey mud.
10 27 .3 S.	121 24 .2	1480	Fine, grey mud. Foraminiferae.
10 29 .0 S.	121 28 .7	1419	Foraminiferae ooze.
8 55 .2 S.	121 41 .5	1150	—
8 59 .0 S.	121 39 .5	1918	Volcanic sand.
9 5 .0 S.	121 42 .3	2596	Not obtained.
Lobetobi Strait.			
8 27 .0 S.	122 54 .5	247	Sandy mud.
Molo Strait.			
8 43 .8 S.	119 45 .7	52	Fine, grey sand.
8 44 .9 S.	119 46 .0	76	Coarse sand.
8 45 .8 S,	119 45 .2	92	Coarse sand, shells and stones.
8 46 .1 S.	119 45 .7	88	Same as above.
8 47 .0 S.	119 45 .8	94	Same as above.

LIST OF DEEP SEA SOUNDINGS BY H. N. M. SURVEYING S.S. "BALI" IN THE EASTERN PART OF THE EAST INDIAN ARCHIPELAGO.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
Makassar Strait and Northwest Coast of Celebes.			
From Muara Bajor Lightship to Stroomen Cape.			
° ′	° ′		
0 48 .0 S.	117 52 .2	74	Sand, stones.
0 46 .0 S.	117 52 .2	72	Sand, stones.
0 45 .7 S.	117 53 .8	266	Sand, stones, shells.
0 45 .3 S.	117 56 .8	338	Stones, shells.
0 44 .3 S.	117 57 .5	360	Stones.
0 44 .2 S.	118 0 .0	686	Mud.
0 42 .5 S.	118 1 .2	786	Mud.
0 41 .9 S.	118 4 .2	1474	Mud.
0 40 .2 S.	118 3 .3	1305	Mud.
0 40 .2 S.	118 7 .0	1915	Mud.
0 38 .0 S.	118 5 .5	1741	Mud.
0 35 .7 S.	118 7 .7	1953	Mud.
0 36 .1 S.	118 11 .0	2016	Mud.
0 33 .7 S.	118 9 .9	2093	Mud.
0 31 .2 S.	118 12 .5	2025	Mud.
0 32 .3 S.	118 14 .7	2065	Mud.
0 29 .2 S.	118 14 .5	2030	Mud.
0 28 .7 S.	118 18 .7	2250	Mud.
0 26 .8 S.	118 16 .8	2261	Mud.
0 24 .2 S.	118 19 .1	2225	Mud.
0 25 .6 S.	118 21 .7	2327	Mud.
0 22 .1 S.	118 21 .4	2264	Mud.
0 21 .8 S.	118 25 .0	2407	Mud.
0 19 .9 S.	118 23 .7	2309	Mud.
0 19 .2 S.	118 27 .4	2462	Mud.
0 17 .8 S.	118 26 .0	2453	Mud.
0 17 .7 S.	118 30 .3	2428	Mud.
0 15 .9 S.	118 29 .3	2430	Mud.
0 15 .5 S.	118 34 .0	2435	Mud.
0 14 .2 S.	118 32 .3	2450	Mud.
0 12 .1 S.	118 35 .8	2444	Mud.
0 12 .4 S.	118 39 .8	2450	Mud.
0 10 .3 S.	118 39 .2	2484	Mud.
0 9 .9 S.	118 43 .5	2453	Mud.
0 8 .4 S.	118 42 .5	2457	Mud.
0 7 .6 S.	118 46 .8	2449	Mud.
0 6 .5 S.	118 45 .9	2489	Mud.
0 4 .7 S.	118 49 .0	2466	Mud.
0 4 .8 S.	118 52 .5	2475	Mud.
0 2 .5 S.	118 52 .5	2441	Mud.
0 1 .8 S.	118 57 .5	2452	Mud.
0 0 .6 S.	118 56 .1	2453	Mud.
0 1 .1 N.	118 59 .0	2474	Mud.
0 2 .9 N.	119 2 .0	2513	Mud.
0 4 .1 N.	119 0 .7	2540	Mud.
0 6 .2 N.	119 5 .6	2493	Mud.
0 8 .0 N.	119 10 .0	2478	Mud.
0 9 .6 N.	119 9 .5	2434	Mud.
0 11 .0 N.	119 14 .7	2511	Mud.
0 12 .5 N.	119 12 .5	2426	Hard.
0 14 .0 N.	119 18 .4	2405	Sand, mud.
0 15 .8 N.	119 16 .2	2417	Hard.
0 17 .0 N.	119 21 .2	2369	Sand, mud.
0 19 .2 N.	119 19 .7	2329	Mud.
0 20 .0 N.	119 23 .9	2030	Mud.
0 22 .2 N.	119 23 .1	2432	Mud.
0 23 .0 N.	119 27 .0	2473	Mud.
0 25 .5 N.	119 26 .5	2554	Mud.
0 26 .4 N.	119 30 .2	2410	Mud.
0 29 .0 N.	119 30 .0	2786	Mud.
0 29 .7 N.	119 33 .0	2425	Mud.
0 32 .0 N.	119 33 .5	2954	Mud.
0 32 .8 N.	119 37 .0	2876	Mud.
0 35 .1 N.	119 36 .5	2966	Mud.
0 36 .0 N.	119 40 .2	2950	Mud.
0 38 .0 N.	119 40 .2	3011	Mud.
0 38 .5 N.	119 43 .5	3029	Mud.
0 40 .0 N.	119 45 .4	2403	Mud.
0 41 .0 N.	119 44 .2	2408	Mud.
0 42 .3 N.	119 49 .0	1976	Mud.
0 44 .7 N.	119 49 .0	2376	Mud.
0 45 .4 N.	119 54 .0	1724	Mud.
0 47 .7 N.	119 50 .1	3215	Mud.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
° ′	° ′		
0 48 .7 N.	119 54 .1	1508	Mud.
0 49 .7 N.	119 55 .3	175	Hard.
0 50 .2 N.	119 51 .3	2767	Mud.
0 50 .5 N.	119 56 .5	2200	Mud.
0 51 .5 N.	119 53 .0	2806	Sand, mud.
0 52 .7 N.	119 54 .5	2900	Mud.
0 52 .7 N.	119 59 .7	2111	Mud.
0 54 .2 N.	119 57 .2	2691	Mud.
0 55 .7 N.	119 58 .7	2396	Mud.
0 55 .0 N.	120 3 .3	1417	Mud.
0 57 .0 N.	120 6 .0	601	Stone.
0 58 .0 N.	120 5 .5	1273	Sand, mud.
0 58 .3 N.	120 8 .3	628	Stone.
1 0 .0 N.	120 8 .3	524	Sand, stone.
1 1 .0 N.	120 11 .5	731	Stone.
1 2 .5 N.	120 11 .7	1616	Sand.
1 3 .5 N.	120 14 .2	2122	Mud.
1 5 .7 N.	120 17 .5	1742	Stone.
1 7 .0 N.	120 19 .0	1359	Sand, mud.
1 7 .8 N.	120 22 .2	1643	Stone.
1 9 .5 N.	120 22 .7	2977	Mud.
1 10 .0 N.	120 26 .7	2635	Mud.
1 11 .7 N.	120 26 .0	2659	Mud.
1 13 .0 N.	120 27 .5	2623	Mud.
1 15 .0 N.	120 28 .7	2587	Mud.
1 13 .2 N.	120 31 .0	2570	Mud.
1 17 .0 N.	120 32 .0	2525	Mud.
1 16 .2 N.	120 34 .3	2106	Mud.
1 18 .5 N.	120 35 .7	2527	Mud.
1 19 .0 N.	120 37 .7	2059	Mud.
1 21 .0 N.	120 38 .8	2455	Mud.

Celebes Sea.

North Coast of Celebes from Stroomen Cape to Menado.

1 21 .5 N.	120 42 .7	1096	Sand, stone.
1 22 .2 N.	120 42 .8	1874	Stone.
1 22 .2 N.	120 46 .0	554	Stone.
1 24 .2 N.	120 47 .0	1156	Stone.
1 23 .5 N.	120 49 .0	603	Hard; sand.
1 25 .2 N.	120 50 .7	1057	Stone.
1 24 .5 N.	120 53 .3	751	Stone.
1 26 .0 N.	120 55 .8	763	Mud.
1 24 .5 N.	120 57 .2	680	Mud.
1 25 .7 N.	121 1 .0	936	Sand.
1 24 .0 N.	121 1 .7	824	Mud.
1 24 .5 N.	121 5 .5	814	Sand, stone.
1 23 .0 N.	121 7 .0	1154	Mud.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
° ′	° ′		
1 24 .0 N.	121 10 .5	1112	Mud.
1 22 .5 N.	121 13 .0	1157	Mud.
1 23 .7 N.	121 15 .7	1687	Mud.
1 22 .0 N.	121 18 .2	1337	Mud.
1 23 .0 N.	121 19 .3	1485	Mud.
1 21 .5 N.	121 22 .5	1042	Mud.
1 22 .5 N.	121 24 .0	916	Mud.
1 21 .3 N.	121 25 .2	878	Stone.
1 22 .3 N.	121 27 .0	967	Sand, mud.
1 21 .2 N.	121 28 .7	832	Stone.
1 21 .7 N.	121 31 .0	1111	Sand, stone.
1 19 .5 N.	121 33 .2	895	Stone.
1 20 .2 N.	121 35 .5	907	Mud.
1 19 .2 N.	121 37 .0	896	Mud.
1 18 .0 N.	121 38 .2	801	Mud.
1 17 .5 N.	121 41 .3	871	Mud.
1 16 .8 N.	121 43 .2	859	Mud.
1 16 .2 N.	121 44 .5	1130	Mud.
1 16 .0 N.	121 47 .0	1667	Mud.
1 15 .3 N.	121 48 .7	1760	Mud.
1 15 .0 N.	121 51 .5	1946	Mud.
1 14 .3 N.	121 53 .0	1944	Mud.
1 14 .3 N.	121 55 .7	1705	Hard.
1 13 .0 N.	121 57 .5	2038	Mud.
1 13 .0 N.	122 0 .2	1501	Mud.
1 12 .2 N.	122 2 .0	1141	Mud.
1 12 .7 N.	122 3 .8	1030	Mud.
1 11 .5 N.	122 5 .3	961	Mud.
1 11 .5 N.	122 8 .0	837	Mud.
1 10 .0 N.	122 9 .0	394	Coral.
1 10 .2 N.	122 12 .5	846	Stone.
1 9 .3 N.	122 13 .0	295	Sand, stone.
1 9 .5 N.	122 16 .0	367	Stone.
1 7 .8 N.	122 18 .0	259	Stone.
1 5 .5 N.	122 20 .0	220	Stone.
1 6 .3 N.	122 23 .5	230	Stone.
1 5 .3 N.	122 24 .7	232	Stone.
1 5 .0 N.	122 26 .5	191	Sand, stone.
1 6 .3 N.	122 28 .8	284	Sand.
1 4 .3 N.	122 32 .2	281	Stone.
1 5 .3 N.	122 34 .0	976	Sand.
1 4 .0 N.	122 35 .5	400	Stone.
1 5 .0 N.	122 37 .0	554	Coral.
1 3 .3 N.	122 39 .2	432	Coral.
1 5 .0 N.	122 41 .5	256	Sand, stone.
1 3 .0 N.	122 43 .0	261	Sand.
1 4 .0 N.	122 45 .0	574	Sand, stone.
1 2 .3 N.	122 46 .3	198	Sand.
1 3 .0 N.	122 49 .0	374	Sand.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
° ′	° ′		
1 2.2 N.	122 56.7	364	Coral.
1 3.0 N.	122 58.5	488	Hard, sand.
1 4.0 N.	123 1.7	576	Sand.
1 3.0 N.	123 2.7	290	Sand.
1 4.7 N.	123 4.7	695	Stone.
1 4.5 N.	123 7.5	643	Coral.
1 6.2 N.	123 9.5	907	Mud.
1 5.7 N.	123 12.5	1044	Coral.
1 7.0 N.	123 17.2	959	Mud.
1 7.0 N.	123 22.0	1411	Mud.
1 8.2 N.	123 23.5	1481	Mud.
1 7.5 N.	123 26.7	2108	Mud.
1 8.5 N.	123 29.7	2610	Mud.
1 10.0 N.	123 31.0	2608	Mud.
1 9.5 N.	123 34.7	1836	Hard.
1 12.0 N.	123 37.0	2192	Mud.
1 11.5 N.	123 38.5	2702	Mud.
1 11.8 N.	123 42.7	2702	Mud.
1 13.2 N.	123 43.3	1838	Mud.
1 12.8 N.	123 46.5	2853	Mud.
1 14.2 N.	123 47.6	2831	Mud.
1 15.5 N.	123 49.3	2966	Mud.
1 16.2 N.	123 52.8	2657	Mud.
1 16.7 N.	123 55.5	2633	Mud.
1 17.5 N.	123 57.0	1814	Mud.
1 18.7 N.	123 59.0	733	Sand.
1 20.0 N.	124 1.3	614	Hard, sand.
1 18.3 N.	124 2.7	572	Hard, sand.
1 20.5 N.	124 3.5	1435	Hard, sand.
1 21.5 N.	124 6.0	1715	Mud.
1 20.0 N.	124 8.0	1631	Mud.
1 22.8 N.	124 9.8	1867	Mud.
1 24.0 N.	124 13.5	2522	Mud.
1 21.8 N.	124 14.3	1663	Mud.
1 24.7 N.	124 17.0	1701	Mud.
1 23.2 N.	124 19.8	1411	Mud.
1 26.2 N.	124 21.2	1670	Mud.
1 27.0 N.	124 24.5	1240	Mud.
1 25.0 N.	124 25.0	990	Mud.
1 28.5 N.	124 28.2	1748	Mud.
1 26.0 N.	124 29.3	1373	Sand, mud.
1 30.0 N.	124 31.5	1175	Mud.
1 28.0 N.	124 33.5	1240	Mud.
1 30.5 N.	124 35.8	1625	Sand, mud.
1 28.0 N.	124 37.0	1465	Mud.
1 30.2 N.	124 41.0	1843	Mud.
1 27.8 N.	124 41.5	1287	Sand, mud.
1 28.5 N.	124 44.5	405	Sand.
1 30.7 N.	124 45.0	1566	Stone.
1 31.3 N.	124 48.5	358	Stone.
1 29.5 N.	124 49.3	484	Sand.

From Makassar to Ambon through Saleyer Strait and Buton Passage. South Coast of Celebes.

5 37.1 S.	119 12.2	424	Stone.
5 41.5 S.	119 13.6	683	Mud.
5 40.5 S.	119 17.2	362	Stone.
5 43.5 S.	119 18.5	650	Sand, mud.
5 43.3 S.	119 22.2	425	Sand, shells.
5 46.0 S.	119 23.2	515	Stone.
5 46.5 S.	119 27.1	344	Stone.
5 48.7 S.	119 28.0	436	Mud.
5 49.5 S.	119 32.0	338	Sand.
5 50.7 S.	119 32.0	378	Sand.
5 50.0 S.	119 34.3	365	Sand.
5 51.0 S.	119 36.6	347	Sand, stone.
5 49.0 S.	119 37.5	265	Sand.
5 47.9 S.	119 40.2	126	Sand, shells.
5 51.0 S.	119 41.8	338	Mud.
5 49.6 S.	119 43.2	238	Sand.
5 48.5 S.	119 43.2	225	Sand.
5 41.4 S.	119 46.4	308	Mud.
5 49.8 S.	119 48.9	311	Sand.
5 49.0 S.	119 52.0	452	Mud.
5 51.5 S.	119 52.0	275	Sand, stone.
5 49.8 S.	119 54.5	448	Sand.
5 51.7 S.	119 56.7	425	Coral sand.
5 49.6 S.	119 59.2	441	Mud.
5 49.8 S.	120 0.5	418	Mud.
5 51.7 S.	120 1.3	450	Coral sand.
5 50.0 S.	120 6.0	455	Mud.
5 51.6 S.	120 5.7	475	Mud.
5 50.8 S.	120 8.0	475	Mud.
5 51.5 S.	120 10.2	499	Mud.
5 50.4 S.	120 11.7	493	Mud.
5 51.5 S.	120 14.5	446	Mud.
5 50.7 S.	120 17.5	423	Mud.
5 51.3 S.	120 20.5	409	Mud.
5 47.5 S.	120 20.6	376	Sand, shells.
5 47.3 S.	120 23.6	326	Sand, stone.
5 44.2 S.	120 23.7	337	Coral.
5 44.0 S.	120 26.0	162	Sand, stone.

Position. Latitude.	Position. Longitude East.	Depth in M.	Bottom.
			Saleyer Strait.
° ′	° ′		
5 41 .1 S.	120 26 .5	691	Sand.
5 42 .5 S.	120 28 .7	527	Stone.
			Banda Sea, Western part.
			From Saleyer Strait to Buton Passage.
5 41 .3 S.	120 30 .6	2330	Mud.
5 42 .5 S.	120 32 .4	2250	Sand, mud.
5 41 .4 S.	120 35 .2	2273	Mud.
5 42 .5 S.	120 36 .5	2437	Mud.
5 41 .5 S.	120 39 .5	2540	Mud.
5 42 .5 S.	120 41 .5	2500	Mud.
5 41 .5 S.	120 44 .2	1157	Sand, mud.
5 42 .6 S.	120 46 .0	1262	Mud.
5 41 .5 S.	120 48 .2	1356	Mud.
5 41 .8 S.	120 50 .8	1532	Mud.
5 41 .2 S.	120 53 .5	1516	Mud.
5 42 .0 S.	120 55 .5	1899	Mud.
5 41 .2 S.	120 57 .5	1894	Mud.
5 42 .0 S.	120 59 .5	2245	Mud.
5 41 .1 S.	121 2 .4	2237	Mud.
5 42 .0 S.	121 4 .4	2333	Mud.
5 41 .1 S.	121 7 .0	2309	Sand, mud.
5 42 .0 S.	121 8 .0	2304	Mud.
5 40 .9 S.	121 9 .5	2468	Mud.
5 42 .0 S.	121 11 .0	2581	Mud.
5 41 .0 S.	121 12 .0	2538	Mud, sand.
5 41 .9 S.	121 14 .3	2399	Mud.
5 41 .0 S.	121 16 .4	2423	Mud.
5 41 .9 S.	121 18 .6	2480	Mud.
5 41 .9 S.	121 21 .4	2520	Mud.
5 42 .0 S.	121 24 .0	2540	Mud.
5 42 .8 S.	121 26 .3	2518	Mud.
5 42 .0 S.	121 29 .2	2446	Mud.
5 43 .8 S.	121 31 .4	2425	Mud.
5 42 .4 S.	121 32 .8	2279	Mud.
5 42 .1 S.	121 34 .4	2250	Hard, sand.
5 44 .5 S.	121 35 .8	2266	Mud.
5 42 .3 S.	121 37 .0	1921	Mud.
5 43 .0 S.	121 39 .5	1278	Sand, mud.
5 45 .2 S.	121 41 .1	1944	Mud.
5 43 .7 S.	121 43 .1	774	Sand.
5 43 .9 S.	121 44 .3	641	Coral.
5 46 .0 S.	121 46 .0	2027	Mud.
5 44 .7 S.	121 48 .6	1138	Mud, sand.
5 47 .0 S.	121 51 .0	1458	Mud.
5 45 .5 S.	121 53 .3	1319	Mud.
5 48 .0 S.	121 56 .0	1939	Mud.
5 46 .0 S.	121 58 .0	2023	Mud.
5 48 .5 S.	122 0 .8	2216	Mud.
5 46 .3 S.	122 5 .9	2070	Mud.
5 48 .8 S.	122 6 .0	2097	Mud.
5 49 .0 S.	122 10 .4	1903	Mud.
5 46 .8 S.	122 13 .0	1534	Sand, mud.
5 49 .7 S.	122 15 .5	1397	Mud.
5 47 .2 S.	122 18 .3	913	Sand, mud.
5 49 .9 S.	122 20 .0	1121	Mud.
5 47 .7 S.	122 24 .0	733	Mud.
5 50 .6 S.	122 25 .2	1481	Mud.
			Buton Passage.
5 47 .9 S.	122 29 .0	976	Mud.
5 50 .8 S.	122 29 .3	2029	Mud.
5 47 .2 S.	122 33 .0	1382	Mud.
5 49 .5 S.	122 34 .9	1692	Mud.
5 47 .2 S.	122 37 .3	1035	Mud.
5 47 .0 S.	122 41 .3	862	Sand, mud.
5 49 .5 S.	122 41 .5	1130	Coral.
5 46 .5 S.	122 44 .8	905	Sand.
5 48 .2 S.	122 46 .5	1096	Sand.
5 44 .5 S.	122 49 .0	551	Stone.
5 47 .0 S.	122 51 .0	1672	Sand, stone.
5 42 .2 S.	122 53 .3	3031	Mud.
5 46 .0 S.	122 55 .3	3022	Mud.
5 40 .0 S.	122 56 .5	3154	Mud.
5 44 .3 S.	122 58 .5	3181	Mud.
5 38 .0 S.	123 0 .3	3146	Mud.
5 41 .1 S.	123 2 .3	3335	Mud.
5 34 .5 S.	123 3 .5	3092	Mud, small stone.
5 37 .6 S.	123 6 .6	2920	Mud.
5 31 .5 S.	123 6 .8	1642	Mud.
5 34 .5 S.	123 10 .0	2059	Sand, stone, coral.
5 28 .5 S.	123 10 .0	1607	Sand.
5 25 .3 S.	123 13 .2	1550	Sand, mud.
5 22 .0 S.	123 16 .0	1777	Mud.
5 29 .5 S.	123 14 .5	1791	Sand, stone.
5 25 .9 S.	123 19 .0	1940	Hard.
5 19 .3 S.	123 19 .3	1636	Mud.
5 22 .1 S.	123 21 .7	1885	Mud.
5 16 .2 S.	123 22 .5	1600	Mud.
5 18 .0 S.	123 24 .0	1838	Sand, coral.
5 12 .5 S.	123 24 .3	949	Sand, stone.
5 13 .0 S.	123 28 .0	1364	Coral, stone.
5 10 .0 S.	123 28 .7	1291	Sand, stone.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
° ′	° ′		
5 9.8 S.	123 31.7	1663	Sand, coral.
5 7.0 S.	123 31.8	1908	Coral, sand.
5 7.6 S.	123 34.4	1723	Sand, mud.

Banda Sea, Northwestern part.

5 3.7 S.	123 35.0	2882	Mud.
5 3.2 S.	123 38.8	2963	Mud.
4 58.0 S.	123 38.2	3139	Mud.
5 1.8 S.	123 42.5	3186	Mud.
4 58.6 S.	123 43.5	2953	Mud.
4 59.7 S.	123 45.8	2486	Sand, mud.
4 58.0 S.	123 47.6	2398	Sand, mud.
4 59.2 S.	123 51.5	2309	Sand, mud.
4 56.7 S.	123 52.2	2767	Mud.
4 55.5 S.	123 56.5	2779	Mud.
5 6.5 S.	123 58.5	1453	Sand, coral.
4 52.8 S.	124 0.0	4196	No bottom-specimen.
4 51.8 S.	124 3.2	4217	Mud.
4 50.5 S.	124 6.8	4099	No bottom-specimen.
4 48.8 S.	124 10.4	4354	Mud.
4 47.9 S.	124 14.7	4849	No bottom-specimen.

Banda Sea, Northern part.
South Coast of Buru and Manipa Strait.

4 5.9 S.	126 57.5	4820	—
4 1.9 S.	127 0.5	4777	Mud.
4 4.5 S.	127 4.0	4514	Mud.
4 0.7 S.	127 6.4	3703	Mud.
4 2.5 S.	127 7.8	3742	Mud.
3 59.8 S.	127 11.4	1908	Stone.
4 1.3 S.	127 13.8	1325	Stone.
3 59.0 S.	127 16.0	1674	Stone.
4 0.0 S.	127 19.2	2126	Stone.
3 57.8 S.	127 20.1	2862	Mud, coral.
3 59.3 S.	127 24.5	2896	Sand, stone.
3 56.5 S.	127 25.5	3404	Mud.
3 55.3 S.	127 29.4	3400	Mud.
3 58.0 S.	127 30.0	3488	Sand, mud.
3 54.5 S.	127 35.0	4181	Mud.
3 56.5 S.	127 35.7	3582	Mud.
3 56.2 S.	127 40.0	3949	Mud.
3 53.7 S.	127 40.9	3488	Mud.
3 55.6 S.	127 44.5	3874	Mud.
3 53.3 S.	127 45.2	2864	Mud.
3 54.0 S.	127 49.8	2878	Mud.
3 51.7 S.	127 49.5	3256	Mud.

From Ambon to Ternate, through the Straits of Manipa, Kelang and Obi.
South Coast of Ambon and Manipa Strait.

3 47.0 S.	128 3.4	626	Sand.
3 50.0 S.	127 55.5	1350	Sand, stones.
3 48.9 S.	127 59.4	896	Sand.
3 48.4 S.	127 57.9	373	Stones.
3 47.5 S.	127 56.5	508	Coral.
3 46.3 S.	127 53.5	1568	Sand, mud.
3 45.0 S.	127 50.0	3064	Mud.
3 42.8 S.	127 50.9	2767	Mud, coral, sand.
3 41.5 S.	127 52.8	1777	Mud.
3 41.2 S.	127 50.4	2810	Hard, sand.
3 40.0 S.	127 47.0	3192	Mud.
3 39.0 S.	127 50.0	3298	Mud.
3 37.3 S.	127 51.0	1485	Mud.
3 36.8 S.	127 44.0	3397	Mud, coral, sand.
3 36.5 S.	127 40.7	3544	Mud.
3 36.2 S.	127 48.3	1818	Sand, coral.
3 34.5 S.	127 49.5	2039	Stones.
3 33.7 S.	127 41.0	3514	Mud, sand.
3 33.5 S.	127 47.5	1962	Hard, mud.
3 32.9 S.	127 36.4	3485	Mud.
3 31.6 S.	127 38.3	2227	Mud.
3 31.3 S.	127 48.0	1634	Sand, stones.
3 30.3 S.	127 39.5	1642	Mud.
3 30.0 S.	127 45.3	1660	Sand, stones.
3 28.9 S.	127 31.5	3114	Sand, stones.
3 28.0 S.	127 35.0	2518	Sand, mud.
3 28.0 S.	127 46.5	1384	Stones.
3 26.0 S.	127 43.0	1307	Sand, stones.
3 25.3 S.	127 32.5	2320	Hard.
3 25.2 S.	127 29.0	3688	Black stones.
3 24.0 S.	127 44.5	1033	Stones, sand.
3 23.0 S.	127 28.8	2180	Stones.
3 22.2 S.	127 41.0	985	Stones, sand.
3 22.2 S.	127 25.0	2605	Coral.
3 21.0 S.	127 27.5	2275	Sand, mud.
3 20.0 S.	127 42.5	904	Sand, stones.
3 19.0 S.	127 39.4	835	Stones.
3 17.8 S.	127 25.5	1118	Stones, coral.
3 16.4 S.	127 22.5	2243	Hard.
3 16.5 S.	127 39.3	801	Sand, shells.
3 15.2 S.	127 36.0	778	Sand, stones.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
° ′	° ′		
3 13.8 S.	127 24.5	1386	Volc. gravel.
3 13.0 S.	127 21.3	1255	Hard.
3 13.0 S.	127 35.5	689	Sand, coral, stones.
3 12.6 S.	127 32.0	871	Hard.
Ceram Sea.			
3 10.0 S.	127 23.5	1109	Stones.
3 9.3 S.	127 32.8	1532	Coral, sand.
3 8.0 S.	127 20.3	1570	Hard.
3 7.3 S.	127 28.6	837	Hard.
3 6.2 S.	127 22.8	871	Sand, stones.
3 5.6 S.	127 30.6	1384	Coral, sand.
3 2.7 S.	127 18.5	2020	Hard.
3 2.3 S.	127 21.7	1624	Sand, stones.
3 2.2 S.	127 26.8	711	Coral, sand.
3 2.0 S.	127 28.9	1033	Coral, sand.
2 58.5 S.	127 20.5	2788	Sand, mud.
2 58.2 S.	127 26.5	2574	Mud.
2 57.4 S.	127 24.0	2570	Sand, mud.
2 57.8 S.	127 18.0	2376	Mud.
2 55.4 S.	127 24.2	2695	Mud.
2 55.0 S.	127 19.2	1735	Mud.
2 54.3 S.	127 21.5	2110	Sand, mud.
2 52.5 S.	127 16.5	1615	Coral.
2 51.4 S.	127 22.0	2243	Coral, stones.
2 50.0 S.	127 19.0	1663	Hard.
2 48.5 S.	127 15.2	2385	Mud, sand.
2 48.0 S.	127 20.0	1960	Coral.
2 46.3 S.	127 16.0	2394	Mud.
2 44.5 S.	127 17.9	1715	Shells.
2 44.5 S.	127 12.5	3031	Mud.
2 40.7 S.	127 14.5	2894	Sand, mud.
2 38.2 S.	127 13.5	3811	Not obtained.
2 38.1 S.	127 5.2	4820	Not obtained.
2 35.7 S.	127 15.5	4820	Not obtained.
2 30.0 S.	127 6.0	4820	Not obtained.
2 25.0 S.	127 8.2	4711	Mud.
2 21.5 S.	127 5.5	3677	Mud.
2 17.8 S.	127 7.3	3004	Hard.
2 14.8 S.	127 3.6	2916	Hard.
2 11.0 S.	127 6.3	2248	Hard.
2 8.2 S.	127 1.8	1607	Stones.
2 4.7 S.	127 3.2	1966	Stones.
2 1.0 S.	127 0.5	2542	Coral.
1 58.0 S.	127 4.5	2497	Coral.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
Obi Strait.			
° ′	° ′		
1 55.6 S.	127 0.5	2012	Mud.
1 54.0 S.	127 5.5	2416	Stones.
1 50.5 S.	127 6.0	1258	Stones.
1 49.5 S.	127 0.5	2117	Stones.
1 46.7 S.	127 6.8	878	Stones.
1 45.2 S.	127 1.2	1546	Stones.
1 43.0 S.	127 5.0	1139	Stones.
1 40.5 S.	127 0.5	1181	Stones.
1 37.8 S.	127 3.0	1411	Stones.
Molucca Passage.			
1 32.0 S.	126 59.2	2599	Stones.
1 35.5 S.	127 0.0	2434	Stones.
1 31.0 S.	127 2.0	2642	Stones.
1 27.0 S.	127 1.5	2506	Stones.
1 26.2 S.	126 58.5	2846	Stones.
1 22.2 S.	127 2.4	3026	Coral, stones.
1 21.5 S.	126 58.5	4010	Mud.
1 18.0 S.	127 1.8	4451	Grey mud.
1 15.5 S.	126 57.6	4423	Sand, mud.
1 14.0 S.	127 0.5	4565	Mud.
1 10.0 S.	127 0.0	4039	Mud.
1 9.0 S.	126 56.2	4210	Mud.
1 4.8 S.	126 59.1	4286	Mud.
1 3.0 S.	126 55.3	4397	Mud.
0 59.0 S.	126 57.5	3184	Coral, stones.
0 58.2 S.	126 55.4	3298	Hard.
0 55.2 S.	126 56.2	2300	Coral.
0 53.5 S.	126 54.5	2992	Hard.
0 50.5 S.	126 55.0	2428	Stones.
0 48.5 S.	126 56.0	2399	Coral.
0 46.0 S.	126 54.4	2434	Sand, mud.
0 43.5 S.	126 52.8	2758	Mud.
0 41.4 S.	126 54.0	2374	Sand, mud.
0 39.5 S.	126 55.0	2461	Sand, stones.
0 36.5 S.	126 53.2	2380	Sand, mud.
0 35.0 S.	126 54.5	2108	Sand, mud.
0 32.5 S.	126 52.5	2405	Sand, mud.
0 30.8 S.	126 51.0	2624	Sand, mud.
0 28.0 S.	126 51.3	2592	Sand, mud.
0 26.5 S.	126 48.8	3190	Sand, mud.
0 24.5 S.	126 50.5	2581	Sand, stones.
0 22.5 S.	126 47.5	2786	Sand.
0 21.0 S.	126 49.5	2437	Sand.
0 19.0 S.	126 46.5	2979	Small stones.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
° ′	° ′		
0 17 .0 S.	126 48 .5	2079	Sand, mud.
0 15 .0 S.	126 46 .0	3227	Sand.
0 12 .8 S.	126 49 .0	1850	Sand, mud.
0 10 .5 S.	126 45 .8	2556	Sand.
0 8 .4 S.	126 48 .5	1631	Coral.
0 6 .0 S.	126 46 .0	2158	Sand.
0 4 .0 S.	126 48 .2	1588	Hard.
0 3 .6 S.	126 50 .7	774	Sand, coral.
0 1 .2 S.	126 46 .5	1667	Sand.
0 1 .0 S.	126 53 .0	801	Sand, coral.
0 1 .3 N.	126 48 .0	1706	Hard.
0 2 .6 N.	126 54 .8	695	Sand.
0 3 .0 N.	126 48 .1	1696	Shells.
0 4 .3 N.	126 46 .5	2059	Stones.
0 6 .0 N.	126 57 .0	337	Sand, coral.
0 6 .3 N.	126 45 .2	2680	Stones.
0 8 .2 N.	126 43 .7	2862	Sand, mud.
0 8 .5 N.	127 0 .4	162	Sand, stones.
0 9 .0 N.	126 59 .0	554	Sand, stones.
0 11 .5 N.	126 45 .3	2830	Stones.
0 12 .5 N.	127 1 .0	234	Black, sand, coral.
0 14 .0 N.	126 45 .5	2452	Sand.
0 15 .5 N.	126 47 .8	3548	Sand, stones.
0 16 .0 N.	127 3 .0	427	Hard.
0 17 .7 N.	126 46 .5	3220	Sand.
0 19 .0 N.	126 49 .2	2345	Stones.
0 20 .8 N.	126 51 .0	2104	Stones.
0 21 .2 N.	126 47 .7	2491	Small, stones.
0 21 .1 N.	127 5 .8	677	Black sand.
0 22 .0 N.	126 54 .2	1055	Stones.
0 22 .5 N.	126 51 .2	1660	Stones.
0 23 .8 N.	126 56 .0	1175	Sand, mud.
0 24 .2 N.	126 53 .5	1490	Stones.
0 25 .5 N.	127 8 .5	648	Hard, sand.
0 25 .8 N.	127 1 .0	1073	Stones.
0 26 .3 N.	126 56 .9	1100	Coral.
0 28 .0 N.	127 2 .5	725	Stones.
0 30 .5 N.	127 11 .4	783	Hard, sand.
0 31 .5 N.	127 4 .0	947	Small, stones.
0 32 .5 N.	127 8 .0	974	Sand, mud.
0 34 .8 N.	127 14 .0	787	Stones.
0 34 .8 N.	127 8 .0	1071	Sand.
0 35 .7 N.	127 11 .6	886	Sand, mud.
0 38 .4 N.	127 12 .0	887	Sand.
0 38 .5 N.	127 16 .5	664	Hard.
0 39 .0 N.	127 14 .4	796	Sand, mud.
0 40 .8 N.	127 16 .0	673	Black sand.
0 42 .0 N.	127 18 .5	569	Sand.
0 42 .0 N.	127 16 .0	632	Sand.
0 44 .0 N.	127 17 .0	610	Coral.

From Ternate to Menado. Molucca Passage.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
° ′	° ′		
0 43 .5 N.	127 13 .8	821	Sand.
0 46 .0 N.	127 13 .0	887	Sand.
0 45 .3 N.	127 10 .0	1134	Sand.
0 48 .0 N.	127 8 .8	1183	Sand.
0 47 .8 N.	127 5 .0	1382	Sand.
0 50 .0 N.	127 4 .3	1616	Sand.
0 50 .0 N.	127 1 .0	1775	Sand.
0 52 .0 N.	127 0 .0	1883	Sand, stones.
0 52 .2 N.	126 57 .2	2171	Sand, stones.
0 54 .7 N.	126 56 .0	2495	Sand, stones.
0 54 .8 N.	126 52 .7	2803	Sand, stones.
0 57 .2 N.	126 51 .3	3163	Mud.
0 55 .0 N.	126 48 .0	3038	Mud.
0 59 .8 N.	126 48 .0	2592	Hard, sand.
0 57 .3 N.	126 44 .2	2261	Coral, sand.
1 2 .2 N.	126 44 .0	2345	Sand, mud.
0 59 .8 N.	126 40 .3	1944	Sand.
1 4 .5 N.	126 39 .5	1514	Coral, stone.
1 2 .5 N.	126 36 .0	1834	Small stones.
1 7 .0 N.	126 35 .0	1843	Coral, sand.
1 4 .8 N.	126 31 .5	2059	Small stones.
1 9 .3 N.	126 31 .2	2112	Small stones.
1 7 .7 N.	126 28 .0	2714	Sand.
1 11 .5 N.	126 27 .0	2592	Stone.
1 10 .0 N.	126 23 .9	2228	Sand, coral.
1 13 .6 N.	126 23 .1	1584	Hard, sand.
1 12 .6 N.	126 19 .5	2218	Mud.
1 15 .8 N.	126 19 .0	1300	Sand, mud, stones.
1 15 .5 N.	126 15 .3	2500	Small stones.
1 18 .8 N.	126 14 .3	2119	Small stones.
1 18 .1 N.	126 11 .0	1800	Sand.
1 21 .6 N.	126 9 .8	1904	Sand, small stones.
1 21 N.	126 7 .0	2029	Sand, small stones.
1 24 .6 N.	126 5 .0	2165	Mud.
1 23 N.	126 2 .2	1906	Sand.
1 27 .7 N.	126 0 .5	1861	Mud.
1 25 .6 N.	125 57 .5	1510	Sand, mud.
1 30 .8 N.	125 56 .2	1584	Sand, mud.
1 28 .0 N.	125 54 .0	1274	Sand, mud.
1 33 .0 N.	125 52 .6	1442	Sand.
1 31 .0 N.	125 49 .2	1541	Sand.
1 35 .6 N.	125 48 .3	1541	Small stones.
1 33 .3 N.	125 44 .5	1850	Sand.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
° ′	° ′		
1 37 .5 N.	125 45 .4	2050	Sand, stones.
1 39 .2 N.	125 41 .0	2104	Mud.
1 35 .3 N.	125 40 .0	2101	Mud.
1 38 .0 N.	125 36 .5	2608	Sand, stones.
1 40 .8 N.	125 37 .3	2542	Mud.
1 40 .3 N.	125 32 .5	2399	Mud.
1 42 .7 N.	125 34 .1	2453	Mud.
1 44 .5 N.	125 30 .0	1937	Hard, sand.
1 43 .0 N.	125 28 .6	1661	Sand.
1 47 .1 N.	125 27 .0	1800	Sand, mud.
1 45 .6 N.	125 25 .0	1453	Sand.
1 49 .7 N.	125 23 .5	1939	Mud.
1 48 .3 N.	125 21 .1	1861	Stone.
Menado Strait.			
1 52 .0 N.	125 19 .2	977	Small stones.
1 50 .5 N.	125 17 .4	1156	Stone.
1 54 .0 N.	125 15 .0	1138	Stone.
1 53 .0 N.	125 13 .2	1532	Sand.
1 56 .6 N.	115 10 .7	1690	Coral.
1 55 .0 N.	125 9 .5	1229	Sand, stone.
1 55 .8 N.	125 5 .5	362	Coral.
1 57 .4 N.	125 6 .0	1442	Sand, coral.

Position.		Depth in M.	Bottom.
Latitude.	Longitude East.		
Celebes Sea.			
° ′	° ′		
1 53 .5 N.	125 2 .0	904	Sand, stone.
1 55 .1 N.	125 1 .5	824	Sand.
1 53 .0 N.	124 59 .5	1211	Sand, mud.
1 50 .5 N.	124 58 .5	1285	Sand, stone.
1 49 .0 N.	124 57 .8	1015	Hard.
1 46 .8 N.	124 56 .5	895	Sand.
1 45 .1 N.	124 54 .7	949	Hard.
1 42 .8 N.	124 53 .0	495	Black sand.
1 41 .0 N.	124 51 .5	536	Black sand.
Bunaken Strait.			
1 39 .3 N.	124 49 .7	459	Black sand.
1 37 .1 N.	124 48 .8	360	Black sand.
1 35 .3 N.	124 47 .3	230	Sand, stone.
Menado Bay.			
1 32 .3 N.	124 47 .8	488	Sand.

APPENDIX III.

DATA CONCERNING THE VOYAGES OF THE S.S. „SIBOGA".

Voyages.	Duration. (days).	Number of hours under steam.	Total number of miles on each voyage.	Coals spent, on each voyage (K.G.).	Coals spent per day. (Tons of 1000 K.G. (Mean).	Number of anchorages	Nights passed steaming or drifting	Number of times anchored during the night.	Number of times got under way during the night	Number of Stations where the trawl was used.	Number of Stations, where the dredge was used.
First voyage. March 7—May 16 1899. Stay of 17 days at Surabaja.	70	581	2244	270.260	3.861	38	15	3	4	23	17
Second voyage. June 2—October 2. 1899. Stay of 19 days at Surabaja.	122	1095	5383	483.225	3.961	68	27	17	6	42	46
Third voyage. Octob. 21— Febr. 26 1899—1900.	128	1086	4715	462.750	3.615	49	33	3	5	38	33
Total	320	2762	12342	1216.235	3.801	155	75	23	15	103	96

On February 21, of 1899, the ship was put at the disposal of the leader of the expedition, and returned to her ordinary service on March 16, 1900.

The scientific, navigating and engineering staff was composed as follows:

5 Naturalists, one of them being the surgeon of the expedition;

3 Naval officers, including the captain;

3 Naval engineers, including the Chief engineer.

1 Draughtsman for zoölogical and botanical work.

Besides these there were 3 european fire-men and 1 steward.

The crew consisted of natives to a total number of 38 (afterwards 45), all belonging to the Royal Navy, viz.:

3 petty-officers;

1 cook;

20 sailors (afterwards 25);

14 fire-men (afterwards 16);

Moreover there were 2 private-servants.

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ERRATA.

Pag. 7, line 14, *for* Kilsoein *read* Kilsuin.

Pag. 32, foot-note should be *read as follows*: In the first monograph of this publication, in which these two figures are also reproduced, there is an error in the legenda.

Pag. 57, line 13 from bottom, *for* Gunong Api, *read* Gunong Ija.

Pag. 76, *for* Sangir Deep *read* Sangir Depression.

DEPTH OF THE SEA
IN THE EASTERN PART OF THE
INDIAN ARCHIPELAGO.

Including the soundings of the „Siboga" Expedition, 1899-1900, and those of the surveying S.S. „Bali" 1900-1901.

By G. F. TYDEMAN, Capt. Lieut. D.R.N.

Scale: 1:3.000.000.

Depths in Metres.

1310. gy.m. *Soundings by H.M. „Siboga."*
450. gy.m. *Soundings by others.*
Reef or bank of small extension.
Reef or bank of some extension.
Limit of 10 Metres of depth.

b.	blue.	f.	fine.	m.	mud.	s.	sand.
blk	black.	for.	foraminiferae.	oz.	ooze.	sh.	shells
br.	brown.	g.	gravel.	p.	pumice.	st.	stones
c.	coarse.	gl.	globigerina.	peb.	pebbles.	w.	white.
cl.	clay.	gn.	green.	pt.	pteropod.	y.	yellow.
crl. or cr.	coral.	gy.	gray.	r.	rock.	v.	volcanic.
crls.	coralsand.	h.	hard.	rad.	radiolaria.		

B. Bay. Bk. Bank. C. Cape. I. Island. R. River. Rf. Reef. Sh. Shoal.

Limits of depths of

0 Metres.	
200	„
500	„
1000	„
2000	„
3000	„
4000	„
5000	„
6000	„

0' 30' 60'
60 Minutes of Lat. and Long.

For details see chart 1-5.

112° Longitude East from Greenwich. 114° 116° 118° 120° 122°

6° 4° 2° 0° 2° 4° 6° 8° 10° 12°

SULU SEA
CELEBE
BORNEO
CELEBES
JAVA SEA
MAKASSAR STRAIT
BALI SEA
FLORES SEA
JAVA
INDIAN OCEAN
SUMBA
(SANDELWOOD I.)
MADURA
BALI
LOMBOK
SUMBAWA
FLORES
PULU LAUT
Basilan Str.
Basilan I.
Tongkil I.
Sulu I.
Sulu-Islands
Pearl Bank
Sandakan Harbour
C. Unsang
Darvel Bay
Sanguisapo
Silakit Passage
Lucia Bay
Bunju I.
Palabangan
Kantungan
C. Mangkalihat
Balabalagan Islands
Sebangkatan
Kabala-dua
Lumu Lumu
Willem
C. Onkona
C. Mumkir
Pulu Tenga or Paternoster Is.
Kawassang
Sailus
Barassa
Tomori Bay
Togean Is.
Boungala
Makassar
Spermonde Is.
Teignmouth Rf.
Kalu Kalukuang Is.
Latimo Bank
Bul
Sabalana or Postillon Is.
Tiger Is.
Kabia I.
Kalao
Kalao Tua
Kabaena I.
Muna I.
Buton
Buton Str.
Bawean I.
C. Gr. Solombo
Arends I.
Little Pulu Laut Is.
C. Selatan
Rattler Rk.
Batu Pangat
Kuto Tower
Delta
Willem I Rf.
Kangeang I.
Urk I.
Sapark Str.
Surabaya
Madura Str.
Djangkar
Bali Str.
Lombok Str.
Alas Str.
Sape Str.
Selayer
Saleyer
Tukulubang
Sangeang I.
Sawu Sea
Sawu I.
Dana I.
Pelindung
Bán
Tomini Bay
Angelica Sh.
Buton Str.
Banda Sea
Reefs
Bombay Castle Bk.
Lubang Buaya
Lubang Tengah
Lubang Timur
Lubang Barat
Lubang Utara
Lubang Selatan
Lubang Tengah
Lubang Timur
Lubang Barat
Lubang Utara
Lubang Selatan

MINDANAO

PACIFIC OCEAN

Palmas I.

Palau Is

Sonsorol Is

Anna I.

Mariere I

Nanusa Is

Kawio

Kakkaralong Is

Karakelang

Talaut Is

Hoolbery Rf.

Lirung

Gr. Sangir I.

Sangir Is

Siau I.

Biaru I.

Menado

Majo I.

Tifori I.

Morotai

HALMAHEIRA (DJILOLO)

Ternate

Makjan I.

Kajoa I.

Weda Bay

MOLUCCA PASSAGE

GILOLO PASSAGE

HALMAHEIRA SEA

Batan I.

Batan Reef

Foul I.

Gagi

Waigeu I.

Jeffam I.

Dampier Str.

Batanta I.

Salawatti I.

Jef Doif I.

Salomakiee

Laiwui

Obi Major

Losios I.

Misool

NEW GUINEA

Asia Is

Aju Is

Mapia Is

Jen Is

Sula Islands

Taliabu

Mangola

Lisamatula

Sula Besi I.

Tallbot Rf.

Lilintah

Daram I.

Berau (Mac Cluer) Gulf

Sabuda I.

Atatanang

CERAM SEA (PITT PASSAGE)

Bonoa I.

Kawa

CERAM

Kelang

Manipa

Manipa Str.

BURU

Bara

AMBON

Nusa Laut

Waru

Geram Laget Is

Geram I.

Wahela Is

Gisser

Banda Sea Ridge

BANDA SEA

Banda Is

Tiun I.

Schildpad I.

Lucipara Is

Manuk

Serua

Nila

Teou

Dammer

Kulewatti B.

Gunong Api

Binongka I.

Tukang Besi Is

Emperor of China

Kei or Ewaf Is

Kur I.

Taam I.

Elat

Dobo

Aru Is

ARAFURA SEA

Roma

Sermata Islands

Wetter

Kisser

Letti

Moa

Lakor

Sermata

Babar

Masela

Tenimber Islands

Timor Laut (Jamdena)

Komba I.

Vassy Rf.

Ombai (Alor)

Kambing

Nusa Besi

Lomblen

Pantar

Ombai Passage

TIMOR (Portuguese)

(Dutch) TIMOR

TIMOR SEA

Troubadour Bk

Flinders Sh.

Evans Sh.

Lynedoch Bk

Indus Bk

Money Sh.

Marie Sh.

Parry Sh.

Sahul Bank

MELVILLE ISLAND

Timor Kupang

Noimini B.

Pasela Bay

Cupis Bay

Hibernia Rf.

Ashmore Rf.

Helena Rf.

Transit Rf.

Tobi

E de Geest del.

DEPTHS OF THE SEA IN

BY G.F.TYDEMAN,

Scale:

According to the latest soundings, inclu

THE INDIAN ARCHIPELAGO,

CAPTAIN LIEUTENANT D.R.N.

1 : 5.000.000.

ling those of the „Valdivia", the „Bali" and „Siboga".

1902.

Chart II.

EGENDA.

ths in Metres.

dings by H.M. Siboga."

dings by others.

r bank of small extension.

r bank of some extension

of 10 Metres of depth.

ud, ox. ooze, s. sand, sh. shells.

Island; R. River, Sh. Shoal, Str. Strait.

s of depth of

0 Metres.

200 „

1000 „

2000 „

3000 „

4000 „

5000 „

6000 „

lon-deposits East of 112°LE.

Chart 1:3000000.

SULU SEA

MINDANAO

PACIFIC OCEAN

BRITISH NORTH BORNEO

Ardasier Bk

Balabak Str.

Brunei Bay

C. Unsang

Darvel Bay

St. Lucia Bay

Basilan Str.

Basilan

Sulu

Sulu Islands

Palao Is

Sonsorol Is

Marière I.

CELEBES SEA

Karkaralong Is

Nanusa I.

Talaut Is

Gr. Sangir

Sangir Is

Siau

Helena Reef

Transit Reef

Mapia Is

Morotai

C. Mangkalihat

Menado

Kwandang

Ternate

HALMAHEIRA (DJILOLO)

MOLUCCA PASSAGE

Djilolo Passage

Halmaheira Sea

Gebe I

Ajul Is

Jen Is

Waigeu I.

Batjan

Kofiau I

Salawatti

GULF OF TOMINI

Togean Is

Donggala

Batu Pangadan

Peling Str.

Sula Is

Bangai I

Taliabu

Mangola

Tomori Bay

Sula Besi I

Obi Major

Misool

CERAM SEA (PITT'S PASSAGE)

NEW GUINEA

Berau (Mac Cluer) Gulf

Atjatuning

Kawa

Bara

BURU

Ceram Ward

Manipa Str.

STRAIT OF MAKASSAR

CELEBES

Borneo Bank

Pulu Laut

Wowoni I.

Muna

Buton

Buton Passage

Kabaena I

Makassar

Tukang Besi Is

Binongka I.

BANDA SEA

Siboga Ridge

Gunong Api

Lucipara Is

Manuk

Banda Is

Serua

Nila

Teou

Dammer

Roma

Sermata Islands

Babar

Timor Laut (Sanderas)

Tenimber Islands

Kai or Ewaf Is

Aru Is

ARAFURA SEA

Sabalana or Postillon Is

Tiger Is

Kabia I.

Kangeang I.

Pulu Tenga or Paternoster Is

Sangeang I.

BALI SEA

FLORES SEA

BALI

LOMBOK

SUMBAWA

Bima

Badjo

FLORES

Lombok Str.

Alas Str.

Bali Str.

Flores Str.

Lomblen

Ombai (Alor)

Ombai Passage

Wetter

Wetter Passage

Letti

Mos

Lakor

Sermata

SAVU SEA

TIMOR (Portuguese)

TIMOR SEA

SUMBA (SANDELWOOD I.)

Timor Kupang

Savu I.

Rotti

Sahul Bank

MELVILLE ISLAND

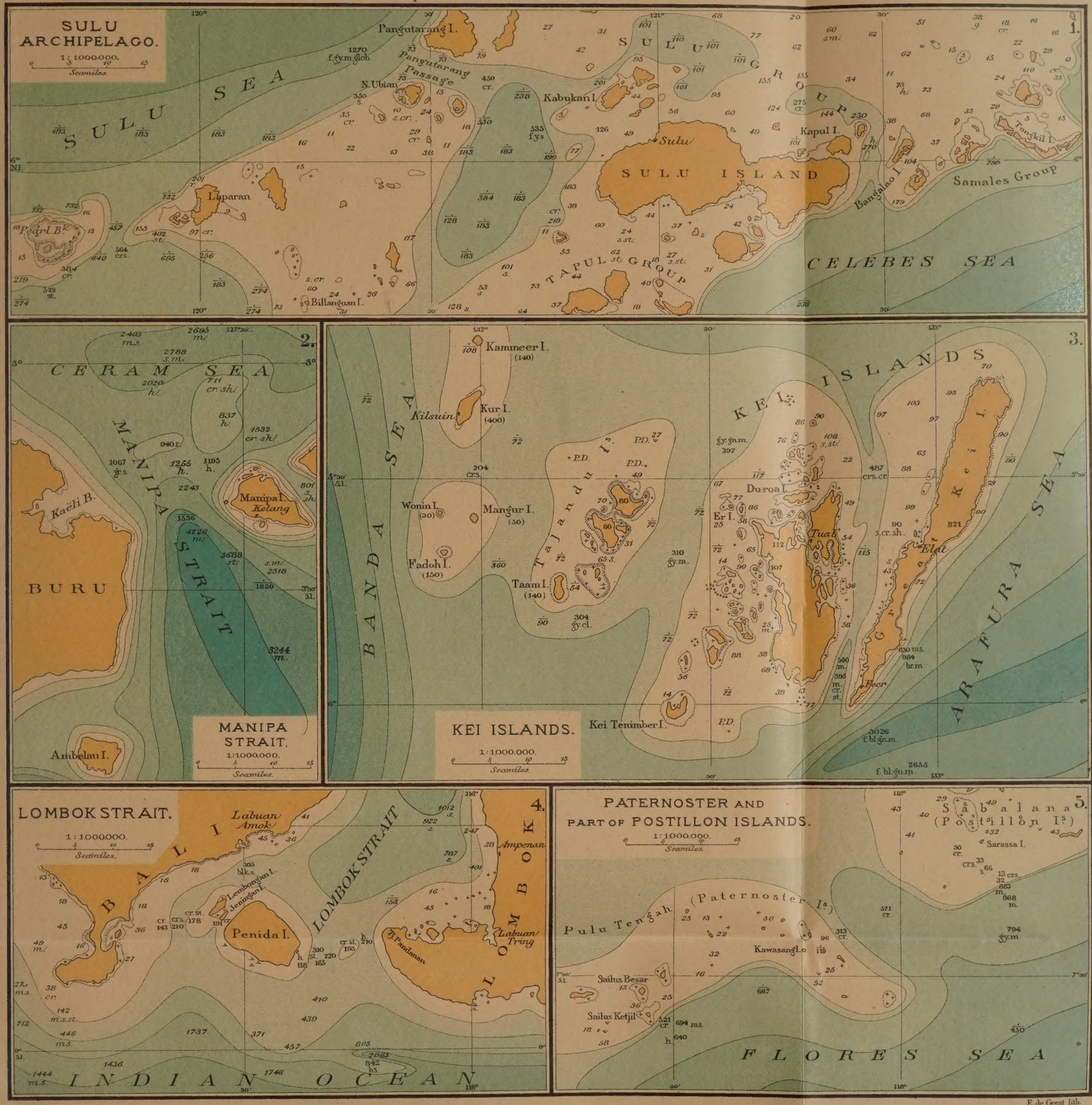
E. de Geest del. & lith.

DEPTHS OF THE SEA IN THE INDIAN ARCHIPELAGO. 1902.

BY G.F.TYDEMAN, CAPT. LIEUT. D.R.N.

For explanation see chart on scale 1 : 3.000.000.

Chart III.



E. de Geest lith.